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# TSUNAMI

*Linking Insurance and Science*

## *Extreme Value Statistics Study Group*
## *1st Meeting at DP Mann, 10:00 to 11:30 on Wednesday, 24 March*

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|---|---|---|---|
| **Attendees:** | Michael Gallen | - | Royal & SunAlliance |
| | Lance Garrard | - | TSUNAMI |
| | Paul Gates | - | Lane Clark & Peacock |
| | Dougal Goodman | - | British Antarctic Survey |
| | Malcolm Higdon | - | Royal & SunAlliance |
| | Gavin Jones | - | CGU Group |
| | Paul Martin | - | Catlin |
| | Annette Oleson | - | Royal & SunAlliance |
| | James Orr | - | TSUNAMI |
| | Pavlos Papachristos | - | Benfield Greig |
| | Peter Taylor | - | DP Mann |
| | James Upson | - | ISL (Sedgwick) |
| **Apologies:** | Andrzej Czernuszewicz | - | Lloyd's Market Risk Unit |
| | Simon Pollack | - | DP Mann |

Peter Taylor opened by explaining the purpose of the study group, to bring new techniques of analysis to the use of the insurance industry. He stressed the need for improved methods, particularly to avoid solvency-threatening losses to the industry.

Dougal Goodman described two methods currently available in the research community dealing with the analysis of extreme events and non-stationarity in time-series.

A broad-ranging discussion followed, which raised the following points:

- Underwriters were influenced in their pricing and acceptance of risks by the likelihood (return period) of "reference losses". These might include "Northridge Earthquake", "87J" or "Andrew". Analyses of the probabilities of these events would have an impact on the industry's perception. **PT**

- Available data was often sparse, particularly for new business. **PM**

- Although the extraction and "normalisation" of data for analysis was an interesting area, the study group should assume that appropriate (if sparse) data will be available. **PT**

- A two day course on Extreme Value Statistics, organised by City Univerity, is available on 2/3 June, for £450. The course will cover Extreme Value Theory, motivating principles, the Generalised Extreme Value distribution, percentile estimation, Generalised Pareto Distribution, choice of threshold, mean excess plots and quantile estimation. The tutor is Dr Mark Dixon, who is a fellow of the Royal Statistical Society, and includes stand-alone software, based on S-plus. **PM**

- S-plus and MatLab are commonly used in the research community and codes supporting these methods should be available in these packages. **DG**

- The study groups research, particularly initially, should seek to demonstrate delivery in a tight time-scale, should always maintain its practical "industry" relevance and this should be checked from time to time. **PT**

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- Some reference losses are "more difficult than others", with no commonly accepted view of their probability. Valuable insight could be gained by analysing these (e.g. Turkish Earthquake). **PG**

- Data availability is highly varied. The methods should address situations where a "mass of data", "a small amount of data" or "no data" is available. **DG**

- Casualty is a potentially rich area for time-series analysis, particularly given time-dependency in the observed data. **PT**

- There are other potential areas for the application of extreme value theory, such as asset-liability modelling. **PP**

- Non-stationarity detection will not have direct application in pricing, but could be used to test the current relevance of historical data sets and in monitoring processes. **JU/PM**

- A project to forecast the likely out-turn of Year 2000 claims, incorporating prior views, emerging claims and anticipating levels of mis-coding, would have a direct business impact. This would be in a "post-event" environment. **MH**

- More information is needed, on the likely "business needs" that would be addressed and the tools that would be used, to make a judgement on whether to support the work. **AO**

- Early delivery will be essential to demonstrate value from the work and should be possible, given the right challenge and tools. **GJ**

- The proposed time-scale, of delivering code within four months, is not practical and would be dangerous if the process of understanding business needs was neglected. **NF**

- Only one or two real worked examples should be chosen for full development. **JU**

- A step-by-step recipe for using some of the analytical techniques is required. **PM**

- Can readily see a number of potential business challenges to be addressed through the research. **PG**

- Work on reference losses will be invaluable to the profile and perceived value of this work. **LG**

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Finally, Michael Gallen re-capped with a proposed re-scheduling of the group's activities:

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| May | To have identified and properly defined the business challenges that should be addressed by the study group |
| | Hold an educational workshop, with tuition on the "analysis recipes" and the theory behind the techniques themselves, probably with Anthony Ledford's help. The aim will be to "level up" the knowledge base of the group. |
| | Encourage members to attend related training workshops, to continue to develop the knowledge base. |
| July | To have properly articulated the tools that have been identified and developed by the group, based on practical business challenges. |
| ***October*** | ***If appropriate, in the light of experience gained through identifying and articulating the business challenges, completing the practical exercises and developing usable tools, to have commissioned software tools to support the analysis.*** |

There was general support for this proposal.

Actions:

1) Continue dialogue with members of study group to:
    a) Identify and articulate potential business challenges. If possible, organise interested sub-groups around these challenges. Peter Taylor and James Orr can meet each of the members individually to facilitate this.
    b) In collaboration with researchers, identify potential tools to address these challenges. If possible, ask individual members or sub-groups to study these techniques and help with step 2.
2) Develop a step-by-step guide to relevant analytical techniques:
    a) GPD, based on Smith/Goodman paper.
    b) Non-stationarity detection, based on Peter Young's time-series analysis.
3) Organise a workshop in May:
    a) To present the step-by-step analytical guide(s).
    b) Agree on the key business challenges that will be addressed by the group.
    c) Learn about potentially useful tools, from an expert in the field.
4) Encourage members of the group to attend an externally run workshop, such as Dr Mark Dixon's in early June.