

## **Quantitative Risk Management**

**A one-day workshop focussing on risk integration.**

Zurich, 15 April 2010 , Swiss Re, Mythenquai 50/60, 8022 Zurich, 09.00 – 17.00

or

Lausanne, 16 April 2010, Hotel Continental, Place de la Gare 2, 1001 Lausanne, 09.00 – 17.00

Registration electronically at [www.actuaries.ch](http://www.actuaries.ch)

Costs: CHF 800,- p.P, (coffee, lunch and documentation included)

Language: English

### **Summary**

The standard formula for solvency capital under Pillar 1 of Solvency II follows a "modular" approach to risk integration where capital requirements for different risk categories are combined using correlation assumptions. At the same time, many insurers are putting effort into the development of "fully integrated", enterprise-wide models of economic capital which attempt to model the sources of dependence in a more realistic way, often through the use of economic scenario generation.

In this workshop we will look in detail at the issue of risk integration and the quantitative modelling challenges it presents. We will look at both the advantages and limitations of the modular and fully integrated approaches and present empirical examples to show how the capital results they deliver may differ. We will show how integrated risk models can be used to allocate or attribute capital for the purposes of risk-adjusted performance measurement, and we will also discuss methods of multivariate stress testing for solvency.

### **Lecturer**

Alexander McNeil is Maxwell Professor of Mathematics in the Department of Actuarial Mathematics and Statistics at Heriot-Watt University. He was formerly Assistant Professor in the Department of Mathematics at ETH Zurich and has a BSc in mathematics from Imperial College, London and a PhD in mathematical statistics from Cambridge University. His interests lie in the development of mathematical and statistical methodology for integrated financial risk management and include extreme value theory (EVT), risk theory, financial time series analysis and the modelling of correlated risks. He has published papers in leading statistics, econometrics, finance and insurance mathematics journals and is a regular speaker at international risk management conferences. He is joint author, together with Rüdiger Frey and Paul Embrechts, of the book "Quantitative Risk Management: Concepts, Techniques and Tools", published by Princeton University Press in 2005.

## Programm details

### 1. Introduction

- \* Solvency II
- \* Economic capital
- \* Enterprise risk management
- \* The basic solvency problem

### 2. Concepts, Techniques and Tools for Integration

- \* Multivariate normal and elliptical distributions
- \* Correlation and copulas
- \* Tail dependence
- \* Risk measures
- \* Measures of diversification
- \* Capital allocation theory

### 3. The Modular Approach

- \* The standard capital formula
- \* When is it justified?
- \* The problem of setting correlations
- \* Using copulas in the modular approach

### 4. The Fully Integrated Approach

- \* Risk factors, mappings and factor models
- \* Economic scenario generation
- \* Modular versus fully integrated: a case study
- \* Quantifying tail dependence in practice

### 5. Stress Testing for Solvency

- \* Defining plausible multivariate stress scenarios
- \* The LSLE concept (least solvent likely event)
- \* Reverse stress testing
- \* Use of fully integrated models in stress testing