



DGVFM-Workshop für junge Mathematiker Wissenschaftszentrum Schloss Reisenburg 28. bis 30. Oktober 2020

Mittwoch, 28.10.2020

Anreise ab 14:00 Uhr möglich

15:00 – 16:00 Uhr

Kaffee und Kuchen

16:00 – 16:30 Uhr

Begrüßung und Einführung,
Vorstellung der Teilnehmerinnen und Teilnehmer

16:30 – 17:00 Uhr

Prof. An Chen
„Informationen zur Aktuarsausbildung (DAV)“

17:00 – 18:15 Uhr

Prof. Dr. Alfred Müller (Universität Siegen)
**„Dependence uncertainty bounds for the energy score
and the multivariate Gini mean difference“ (joint with
Carole Bernard and Marco Oesting)**

18:30 Uhr

Abendessen

Donnerstag, 29.10.2020

08:30 - 09:15 Uhr

Frühstück

09:30 - 10:45 Uhr

Dr. Frank Halanke (Allianz SE, DHBW Stuttgart)
„Investment strategies for long-term liabilities“

10:45 – 12:00 Uhr

Dr. Frank Bosserhoff (Universität Ulm)
**„On the investment strategies in occupational
pension plans“**

12:30 – 13:30 Uhr

Mittagessen

14:00 – 15:15 Uhr

Dr. Michael Kochanski (SV SparkassenVersicherung
Lebensversicherung AG)
**„Compression of life insurance portfolios:
Model, process, innovative approaches “**

15:15 – 15:45 Uhr

Kaffeepause

15:45 – 17:00 Uhr

Dr. Manuel Rach (Universität Ulm)
„Analysis of Tontines from the Insurer's Perspective“



18:30 Uhr

Abendessen

Freitag, 30.10.2020

08:30 - 09:15 Uhr

Frühstück

09:30 - 10:45 Uhr

Gabriela Zeller (Universität Ulm)
**„A comprehensive model for cyber risk based on
marked point processes and its application to
insurance“**

10:45 - 12:00 Uhr

Dr. Peter Hieber (Universität Ulm)
**"Retirement products and subjective mortality beliefs"
(joint with An Chen and Manuel Rach)**

12:00 - 12:15 Uhr

Abschlussrunde, Evaluation

12:30 Uhr

Mittagessen

14:00 Uhr

Ende der Veranstaltung

Vorträge / Referent*innen

Prof. Dr. Alfred Müller

„Dependence uncertainty bounds for the energy score and the multivariate Gini mean difference“ (joint with Carole Bernard and Marco Oesting)

There is an increasing interest in recent years in methods for assessing the quality of probabilistic forecasts by so called scoring rules.

For forecasting general multivariate distributions, however, there are only a very few scoring rules that are considered in the literature.

In their fundamental paper, Gneiting and Raftery (2007) considered the so called energy score as an example of a scoring rule that is strictly proper for arbitrary multivariate distributions. Pinson and Tastu (2013) started a debate on the discrimination ability of this scoring rule with respect to the dependence structure. In this talk I want to contribute to this discussion by deriving dependence uncertainty bounds for the energy score and the related multivariate Gini mean difference.

This means that we derive bounds for the score under the assumption that we only know the marginals of the distributions, but do not know anything about the dependence structure, i.e. the copula. We will derive some analytical bounds that are sharp in some cases. In other cases we will derive interesting numerical bounds by using a variant of a swapping algorithm. It turns out that some of these bounds are attained for some non-standard copulas that are of interest in their own right.

Education:

- Diploma Studies in Mathematics and Business Science (Wirtschaftsmathematik), University of Karlsruhe, Germany, 1986-1991, Thesis: Bayes-Modelle für sequentielle Verkaufsprobleme (Bayesian models for sequential asset selling problems). Supervisor: Prof. Hinderer
- Ph.D. in Mathematics, University of Karlsruhe, Germany, Februar 1995, Dissertation: Integralindizierte Ordnungen und Metriken auf Mengen von Wahrscheinlichkeitsmaßen mit Anwendungen bei Markoffschen Entscheidungsprozessen. (Stochastic Orders and Probability metrics generated by integrals: with applications to Markov Decision Processes). Supervisor: Prof. Hinderer
- Habilitation, University of Karlsruhe, Jan. 2000, Thesis: Stochastic orders and the comparison of size, variability and dependency of risks.

Positions:

- Oct. 1988 - Sept. 1991, Teaching Assistant, University of Karlsruhe
- Oct. 1991 - Sept. 1995, Research Assistant, University of Karlsruhe
- Oct. 1995 - Sept. 2000, Lecturer (wiss. Assistent (C1)), University of Karlsruhe
- Oct. 2000 - Sept. 2006, Reader (Hochschuldozent (C2)), University of Karlsruhe
- Oct. 2006 - March 2007, Temporary Professor (Vertretungsprofessur), Department Mathematik, University of Siegen
- April 2007 - March 2008, Senior Lecturer, Department Actuarial Science and Statistics Heriot-Warr University, Edinburgh, UK
- April 2008 - today, Professor, Department Mathematik, University of Siegen

Main Research Interests:

Stochastic order relations and modelling dependence, theory of copulas and Lévy copulas, actuarial and financial mathematics, stochastic models for electricity markets and electricity derivatives, stochastic models for sea level and flood data, risk measures, Markov decision processes, optimal stopping problems, decisions under risk and uncertainty

Dr. Frank Halanke

„Investment strategies for long-term liabilities“

In this talk we discuss the main risk drivers for very long-term liabilities and the corresponding asset portfolios on the example of pension obligations. We develop the strategic long term targets for the investment strategy and tactical short term constraints.

We will gain an understanding of the valuation of long-term liabilities with payments far beyond 30 years under different regulatory frameworks like Solvency II and IFRS. For this valuation the choice of a discount curve is essential but everything else than trivial as there is no deep market of bond instruments for such long maturities. We compare the “ultimate forward rate” used in Solvency II to deal with this problem with methods used under IAS19 which is explicitly excluding any use of such an a priori defined rate. Therefor even a perfect match under Asset Liability Modeling (ALM) aspects could lead to duration mismatches and Solvency Capital Requirements (SCR) given the different regulatory regimes of IFRS and Solvency II for assets and liabilities.

Finally we discuss why an holistic Environmental Social and Governance (ESG) approach plays a fundamental role for these long term investments and what UN-Convened Net-Zero Asset Owner Alliance (AOA), a group of long-term investors representing \$5 trillion assets under management, can possibly contribute to this development in the future, maybe as well from a mathematical point of view.

Dr. Halanke übernahm 2006 die Funktion des Global Actuary in der Allianz SE. Davor war er Mitglied der Geschäftsleitung der Allianz Financial & Insurance Services GmbH und Leiter Bilanzlösungen der Allianz Dresdner Pension Consult. Vor seiner Zeit im Allianzkoncern war er 5 Jahre bei KPMG im Bereich Actuarial Services. Er ist Mitglied der DAV, der IEBA, des IVS und speziell dessen Arbeitsgruppe internationales. Daneben ist er als Gastprofessor an der DHBW in Stuttgart tätig.

Dr. Frank Bosserhoff

„On the Investment Strategies in Occupational Pension Plans“

Nowadays Defined Contribution (DC) plans are the predominant form of occupational pension plans.

Thereby, regular contributions are made to an external pension fund, which in turns invests the money at the financial market. A typical asset chosen by such a fund is a Target Date Fund (TDF); these funds are usually characterized by a decreasing amount invested in equity over time, a so called glidepath. Modeling the contributions made by a stochastic process and the evolution of the fund according to a stochastic volatility model, this paper investigates whether the aforementioned glidepath structure is indeed optimal for retirement planning. We tackle this question through a formulation as stochastic optimization problem that is solved by means of a Least-Squares Monte Carlo approach. Depending on the risk aversion, we find that the glidepath structure is optimal even in a complex market setting. Comparisons with a deterministic volatility model are drawn and the impact of stochastic volatility on the optimal investment strategies are illustrated.

Dr. Michael Kochanski

„Compression of life insurance portfolios: model, process, innovative approaches“

Assessing the performance and identifying potential risks of a life insurance company require simulations of the future development of its portfolio of insurance contracts. Such actuarial projections are necessary for different purposes such as a company's asset-liability-management and internal planning process as well as for regulatory aspects, e.g. Solvency II. Although most life insurance companies perform some kind of portfolio compression, there exists no industry-widely accepted standard method. We present how the SV SparkassenVersicherung reinvented and to a great extent enhanced its compression process based on the findings and analyses of a doctoral student at Ulm University. This comprises a complete restructuring and reimplementation of the compression process as well as the application of novel intelligent compression approaches.

Dr. Manuel Rach

„Analysis of Tontines from the Insurer's Perspective“

In order to provide the insurer more incentives to manage modern tontine schemes, we explicitly consider two fee structures paid to the insurer: a single initial fee, and a variable fee. Given the two fee structures, we determine the optimal tontine payoffs to the policyholder and the expected utility of the policyholder. We conclude that even with tontine fees of 12% the initial wealth, risk averse pension savers would have a higher utility in tontines than in annuities charging around 14% the initial wealth. We also propose dynamic variable fees charging exclusively the first ten years, which could leave the pensioners in a better position in the older ages.

Gabriela Zeller

„A comprehensive model for cyber risk based on marked point processes and its application to insurance“

Recently, an increasing number of researchers and practitioners from different disciplines have analyzed cyber risk and different approaches to understanding and quantifying this new type of risk have been proposed. Still, an agreed-upon framework and a unified quantitative understanding of cyber risk and its underlying drivers is still at its infancy. Due to the particular properties of cyber risk such as lack of historical data, interdependence of risk and IT security and difficult impact determination (e.g. intangible losses due to data loss, business interruption or reputational damages), classical actuarial approaches face numerous challenges.

The present work scrutinizes technical, legal, financial, and actuarial aspects of cyber risk as a basis to propose a new approach for modelling cyber risk using marked point processes.

The resulting model is able to include the influence of key covariables, required to model frequency and severity of cyber claims, and the dynamic nature of cyber risk, while also capturing accumulation risk in a realistic way. It takes into account different types of cyber attacks (classified according to their compromise of defined information security goals) and their causes, namely malicious untargeted and targeted attacks as well as human and technical failure.

The model is studied with respect to its statistical properties and applied to the pricing of cyber insurance and risk measurement. The results are illustrated in a simulation study, with particular focus on the importance of considering accumulation risk and prudent policy design in the cyber context.

The presentation concludes with an outlook of opportunities for future research in the cyber risk and insurance domain, such as the design of cyber insurance products transcending mere risk transfer.

Dr. Peter Hieber

„Retirement products and subjective mortality beliefs“ (joint with An Chen and Manuel Rach)

This talk first gives an overview of different retirement products and their way of sharing mortality risks. We, in detail, look at conventional annuities (insurance provider takes the mortality risk) and tontines (a pool of policyholders shares the mortality risk). Next, we discuss the fairness of such products from the insurer's perspective and compare this to the perceived attractiveness of an insured. We take into account empirical studies that confirm that individual's subjective mortality beliefs deviate from the information given by publicly available mortality tables.

In an actuarially fair world without subjective beliefs, policyholders always prefer a secure annuity payoff to a tontine (Yaari [1965]). We show that subjective mortality beliefs can easily reverse this result, that is tontine products are perceived more attractive than annuities.

Since July 2014, Dr. Hieber is a PostDoc researcher at the Institute of Insurance Science at Ulm University (Prof. Dr. An Chen). In between he was also PostDoc at Université Catholique de Louvain (Prof. Pierre Devolder, Prof. Griselda Deelstra) and had a professorship (W2) "Risk and Insurance" at TU Munich. Since October 2019 he participates at DAAD-Prime Research Fellowship Université Catholique de Louvain, Belgium.

His research is in Mathematical Finance and Actuarial Science. He works on:

- the risk management, pricing and hedging of financial derivatives and insurance contracts
- optimal, innovative (insurance) contract design, utility maximization, optimal control and optimal asset allocation
- dependence modeling and efficient numerical routines
- the analysis of risk sharing concepts in finance and insurance.