DGVFM-Workshop für junge Mathematiker
Wissenschaftszentrum Schloss Reisensburg
24. bis 26. Oktober 2018

Mittwoch, 24.10.2018

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 Aktuarausbildung (DAV)"**
17:00 – 18:15 Uhr	Prof. Michel Vellekoop (University of Amsterdam) **„Term Structures with Converging Forward Rates"**
18:30 Uhr	*Abendessen*

Donnerstag, 25.10.2018

08:30 - 09:15 Uhr	*Frühstück*
09:30 - 10:45 Uhr	Prof. Katrien Antonio (KU Leuven) **„Data Analytics for Claims Reserving"**
10:45 - 12:00 Uhr	Markus Gottwald (Deutsche Rückversicherung AG) **„Grundzüge der (Lebens-) Rückversicherung"**
12:30 – 13:30 Uhr	*Mittagessen*
13.30 - 14:30 Uhr	**Führung durch Schloss Reisensburg**
15:00 – 15.45 Uhr	*Kaffeepause*
15:45 – 17:00 Uhr	Prof. Łukasz Delong (*Warsaw School of Economics*) ***„Fair valuation of Insurance Liabilities"***
17:00 – 18:15 Uhr	Prof. Mirko Kraft (Hochschule Coburg) **„Measuring of Group Solvency Risks: A Consolidated Economic View"**
18:30 Uhr	*Abendessen*

Freitag, 26.10.2018

08:30 - 09:15 Uhr	*Frühstück*
09:30 – 10:45 Uhr	Prof. Rudi Zagst (Technische Universität München) **„Behavioral Finance Driven Investment Strategies"**
10:45 – 12:00 Uhr	Prof. Nicole Branger (Universität Münster) **„Pricing Insurance Risk"**
12:00 – 12:15 Uhr	Abschlussrunde, Evaluation
12:30 Uhr	*Mittagessen*
14:00 Uhr	*Ende der Veranstaltung*

Vorträge / Referenten

Prof. Michel Vellekoop
„Term Structures with Converging Forward Rates "

The choice of a discount curve that can be used for the valuation of long-term liabilities of insurance firms and pension funds has become a topic of intensified debate. The market consistent valuation principle, which has been introduced for European insurance firms via the Solvency II regulatory framework, is not straightforward to implement for liabilities with long time horizons, since interest rate instruments such as bonds and swaps are not always liquidly traded for maturities beyond 30 years. Interpolation and extrapolation methods must therefore be specified before a term structure can be estimated based on available market data. A popular choice is the Smith-Wilson methodology which uses exponential tension splines to guarantee convergence of forward rates beyond a so-called last liquid point. The limit, an "ultimate forward rate", must be specified a priori.
We will show how one can take a variational optimization problem as the most natural formulation for inter- and extrapolation problems involving term structures and use this to define a new approach which no longer requires that the limit of the forward rates is imposed a priori. We give conditions which make sure that the optimization problems involved are well-posed, and solutions are characterized using a function space which differs from the one proposed by Smith and Wilson. In this framework, one can write down equations which define the optimal ultimate forward rates directly in terms of prices and cashflows of traded instruments. The new method therefore allows us to use raw market data to extract information about the levels and volatilities of long term forward rates, and provides an objective method to monitor the stability of such estimated quantities over time. (Joint work with Jan de Kort).

Dr Michel Vellekoop has been named Professor of Life Insurance in the Faculty of Economics and Business at the University of Amsterdam (UvA) since 2009. After earning his PhD at the Imperial College of Science, Technology and Medicine in London, Vellekoop worked as University Lecturer and Senior University Lecturer in the Department of Applied Mathematics at the University of Twente from 1998 until 2009. From 2004 he has also been Director of Research of The Derivatives Technology Foundation (TDTF), an organisation engaged in derivatives research. From 2001 until 2005 Vellekoop was a member of the Board of the Royal Mathematics Society (*Koninklijk Wiskundig Genootschap*). He is specialised in the field of financial mathematics, with work focusing on the theory behind the stochastic processes used to model financial markets. As a researcher at the UvA he has concentrated on adapting this theory for use in the pension and insurance sector, with a particular focus on identifying better methods for managing risk in insurance products. His has published in various international journals, including *Stochastic Processes and Their Applications*, *Journal of Computational Finance* and *Mathematical Finance*.

Prof. Katrien Antonio
„Data Analytics for Claims Reserving"

To be able to fulfill future liabilities, insurance companies will hold sufficient capital reserves. Loss reserving deals with the prediction of the remaining development of reported, open claims (the reported but not settled reserve) and unreported claims (the incurred but not reported reserve). Accurate, reliable and robust reserving methods for a wide range of products and lines of business are a key factor in the stability and solvability of insurance companies. Micro-level reserving approaches the reserving problem by using granular, detailed data on the development of individual claims. In this talk we give an overview of the research on micro-level reserving. We present ongoing developments in this field, highlight their possible strengths but also weaknesses,

and formulate current challenges. We pay specific attention to the structure of micro-level data, and the use of statistical modeling and data analytic tools for reserving with granular data. We illustrate our talk with case-studies.

Katrien Antonio is an Associate Professor in actuarial Science at the University of Amsterdam and at KU Leuven in Belgium. Her research interests are in general actuarial science, applied statistics, quantitative risk modelling. She is an expert in loss reserving, ratemaking, pricing, actuarial statistics, insurance analytics, predictive modelling and data mining. Her works were covered (among others) in Journal of the Royal Statistical Society: series C (applied statistics), Astin Bulletin, Scandinavian Actuarial Journal, and North American Actuarial Journal.

Markus Gottwald
„Grundzüge der (Lebens-) Rückversicherung"

In dem Vortrag wird zunächst neben einem grundsätzlichen Überblick eine Einführung in die klassischen Formen der Lebensrückversicherung am Beispiel einer proportionalen und einer nichtproportionalen Rückversicherung gegeben. Hierbei wird die Lebensrückversicherung aus verschiedenen Blickwinkeln betrachtet und neben dem Risikotransfer und Dienstleistungen aus der Rückversicherung auch vertragsgestalterische und aufsichtsrechtliche Aspekte untersucht. Im Abschluss diskutieren wir, inwieweit Rückversicherung auf die großen Herausforderungen der aktuellen Lebensversicherungsbranche unterstützen kann.

Markus Gottwald is General Manager at the „Verband öffentlicher Versicherer" and „Deutsche Rückversicherung AG". His interests are in finance reinsurance and in Solvency II. Since 2008 he is member in the German Association of Actuaries. He works as lecturer for the German Actuarial Academy DAA and the European Actuarial Academy EAA in the field of Solvency II.

Prof. Łukasz Delong
„Fair valuation of Insurance Liabilities"

In this talk we discuss fair valuation of insurance liabilities both from practical and theoretical point of view. We start with presenting main principles used in practice in Solvency 2 and IFRS 17 for market-consistent valuation of liabilities which are contingent on insurance and financial risk. Next, we solve the problem of market-consistent valuation of liabilities in a combined financial and insurance market by developing a new mathematical model. We assume that the hedgeable risk of the liability is hedged and replicated with the investment portfolio which is constructed under the mean-square hedging error for the future pay-off. Consequently, the price of the hedgeable risk of the liability coincides with the price of the investment portfolio. The remaining non-hedgeable risk of the liability is priced with an actuarial risk margin. We allow for dynamic hedging in the financial market and dynamic re-pricing the liability. We derive a partial differential equation (PDE) for the pricing operator arising in the continuous-time limit of the multi-step backward re-pricing iterations for the next period liability. We discuss the structure of the derived PDE and the risk premium for the non-hedgeable risk. Finally, we propose a PDE for a general pricing operator in our continuous-time model with dynamic hedging. The model is based on a joint work with Jan Dhaene and Karim Barigou.

Łukasz Delong is an Associate Professor at the Warsaw School of Economics for the Institute of Econometrics, Division of Probabilistic Methods. He is a member of the Education Committee of the Warsaw Actuarial Summer School, an Associate Editor of Prawo Asekuracyjne, a representative of the Polish Society of Actuaries in the Education Committee of the International Actuarial Association, a representative of the Polish Society of Actuaries in the Education Committee of the Actuarial Association of Europe, and Board Member of the Polish Society of Actuaries (Vice-

President since 2015). His research interests include insurance and financial mathematics, BSDEs, stochastic control theory, and non-life ratemaking and reserving. His works were covered (among others) in Annals of Applied Probability, Astin Bulletin, Insurance: Mathematics and Economics, Scandinavian Actuarial Journal, and Stochastic Models.

Prof. Mirko Kraft
„Measuring of Group Solvency Risks: A Consolidated Economic View"

Group solvency calculations under different risk measures are analysed taking into account different regulatory regimes. This is key to understand international insurance markets, because they are highly dominated by large insurance groups (or financial conglomerates). The Insurance Capital Standards (ICS 1.0) for Internationally Active Insurance Groups (IAIGs) were released in July 2017 by the International Association of Insurance Supervisors (IAIS) for extended field testing. We compare them in respect of efficient capital allocation with the Solvency II group solvency capital requirements (Group SCR), which came into effect from 1st January 2016 for EU based insurance groups. Other countries like China introduced solvency regimes with characteristics which are similar to Solvency II techniques (C-Ross). However, the ICS are expected to be the future risk-based global standard for group solvency calculations and the foundation of a Higher Loss Absorbency (HLA) for Globally Systemic Important Insurers (G-SIIs). The IAIS proposes to treat insurance groups for calculating their capital requirements as single economic entity and to start from consolidated data. However, legal structures and risk categories of insurance groups vary and the (pure) consolidated view might be not appropriate. As under Solvency II the Value-at-Risk (VaR) is proposed as risk measure. There are some known shortcomings of the VaR: e. g. it is not coherent. The Conditional Value-at-Risk (CVaR) fulfils the criteria of sub- additivity and allows therefore a more intuitive capital allocation within an insurance group. The scope of risk measures could be broadened by the class of spectral risk measures. This might be helpful for a better understanding of the interplay of solo and group supervision in practice.

Mirko Kraft is a full professor in the Faculty of Economics and Business at the College of Coburg. He is specialized in the field of controlling and risk management (in insurance companies), insurance regulatory framework Solvency II, performance accounting and cost management. He plays a part in the "Forum V – north Bavarian Institute for Insurance Science and Economics at the University of Erlangen-Nürnberg. He is chairman of the Society for Economics e.V. (GfB).

Prof. Rudi Zagst
„Behavioral Finance Driven Investment Strategies"

Portfolio-insurance strategies, such as the constant-proportion portfolio insurance (CPPI), as well as liability-driven investment strategies (LDI) are economically important to investors like insurance companies and pension funds. However, non-anticipated shocks in stock prices, negative interest rates or overnight trading restrictions could drop portfolio values below desired levels making the application of a CPPI impossible or an LDI underfunded. We consider behavioral aspects from cumulative prospect theory (CPT), in particular risk-averse behavior for gains, risk-seeking behavior for losses and probability distortion, and develop optimal investment strategies that allow for situations of falling short a given benchmark or being underfunded. We compare the optimal investment strategies to the standard CPPI and traditional LDI approaches.

Rudi Zagst is a full professor in the Chair of Financial Mathematics at the Technical University of Munich. Prof. Zagst is the honorary chairman of the supervisory committee of the RiskLab GmbH and a member of the Academic Advisory Committees of the Professional Risk Managers' International Association (PRMIA). His research focus is in the field of financial engineering, risk

and asset management, in particular, modeling of financial markets as well as assessment of financial products and the quantification of their risks. His works were covered (among others) in Annals of Operations Research, Quantitative Finance, Journal of Derivatives, European Actuarial Journal, Journal of Credit Risk, and Journal of Empirical Finance.

Prof. Nicole Branger
„Pricing Insurance Risk"

Insurance contracts usually earn a negative expected excess return. While the negative risk premium can be explained by the negative correlation between the payoff of the insurance contract and the consumption of the insured, the absolute size of this premium seems more puzzling. In this paper, we rely on the idea of disaster risk models to study the absolute size of the premium. Different from standard asset pricing models, we focus on disasters in individual consumption instead of aggregate consumption and assume that the market for insurance contracts is incomplete. This setup generates large risk premiums for rare but extreme losses, and shows that the insured are willing to accept a negative premium for insuring risks that are perfectly diversifiable.
In the talk Prof. Branger would like to respond to Asset Pricing in general:
In the talk, we will also consider asset pricing in general. The starting point is the basic Lucas tree model with CRRA preferences and i.i.d. consumption growth. While conceptually straightforward, this model gives rise to several puzzles, the most prominent ones being the equity premium puzzle and the interest rate puzzle. Modern approaches that solve these puzzles are disaster risk models, long-run risk models, and models with habit formation. I will comment on the basics of these models. Disaster risk models are used in the paper and thus presented in more detail, and if time allows, I will also give some more details on long-run risks models.

Prof. Dr. Nicole Branger is a chair professor in Derivate and Financial Engineering at the University of Münster. Her research interests are in asset pricing, asset allocation and economics of derivatives. Her works were covered (among others) in the Journal of Financial Quantitative Analysis, Review of Finance, Journal of Economic Dynamics and Control, and Journal of Banking and Finance.
She is regularly a visiting Professor at the Owen Graduate School of Management of the Vanderbilt University. She is also a co-author of the book „Interest Derivatives".