2024 Risk and Actuarial End-of-Year Seminar Day

SUMMARY

This half-day workshop is hosted by the UNSW School of Risk and Actuarial Studies. The event features four seminars delivered by leading scholars in actuarial and financial mathematics, which include

- Hansjörg Albrecher (University of Lausanne)
- Martino Grasselli (Università di Padova and Pole Universitaire Léonard de Vinci)
- Steven Vanduffel (Vrije Universiteit Brussel)
- Mario Wüthrich (ETH Zurich)

The speakers will present their work in relation to state-of-the-art methodologies in the field. The workshop is a valuable opportunity for participants to exchange research ideas and connect with these world-leading academics.

Registration is free, but spaces are limited.

DATE

Monday, 16 December 2024, 9.30 am – 1:00 am

(Registration opens at 9am. Participants can grab a cup of coffee at Plume Cafe (https://maps.app.goo.gl/VoQeZgN7ziaChnZh9) between 9am and 9:30am using code "Risk & Actuarial".)

VENUE

Colombo Building Theatre B (https://g.co/kgs/YXHtyRR)

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Program (Monday, 16 December 2024), Venue: Colombo Building Theatre B

9:00 – 9:30	**Registration (Free coffee pick up from Plume Cafe using code: Risk & Actuarial)**
9:30 – 9:35	**Welcoming remarks**
9:35 – 10:20	**Seminar 1** Hansjörg Albrecher, University of Lausanne *Allocating capital to time: introducing credit migration for measuring time-related risks*
10:20 – 11:05	**Seminar 2** Steven Vanduffel, Vrije Universiteit Brussel *Optimal life-contingent payoffs: a peer to peer solution*
11:05 – 11:25	**Coffee break**
11:25 – 12:10	**Seminar 3** Martino Grasselli, Università di Padova and Pole Universitaire Léonard de Vinci *Objective pricing of illiquid assets: a deep learning approach in the art market*
12:10 – 12:55	**Seminar 4** Mario Wüthrich, ETH Zurich *Observation-driven state-space models for experience rating*
12:55 – 13:00	**Closing remarks**

Abstracts of presentations

Speaker: Hansjörg Albrecher (University of Lausanne)

Title: Allocating capital to time: introducing credit migration for measuring time-related risks

Abstract: Assessing time-related risks in long-tailed insurance is challenging. Regulatory capital allocation rules may underestimate credit deterioration risk by not requiring insurers to hold solvency capital early, while actuarial practices often allocate capital sooner than mandated. We propose a framework to quantify these time-associated risks and evaluate capital allocation strategies based on time to ultimate, aiming to manage long-tail business effectively. By modeling the impact of exogenous credit migration risk, we evaluate six strategies, including costs associated with potential company bankruptcy until long-term claims are settled. We illustrate the approach in a concrete example where we estimate a Markov chain credit migration model with insurance market data and analyze liability values of a future risk from various capital management strategies. Our findings show that early capital raising is costly, even with penalties for avoided credit risk, unless the company's initial credit rating is poor. In such cases, purchasing protection through a credit derivative may be more efficient, if available.

This is joint work with Michel Dacorogna.

Speaker: Steven Vanduffel (Vrije Universiteit Brussel)

Title: Optimal life-contingent payoffs: a peer to peer solution

Abstract: In this paper, we consider an investor with a general state-dependent utility in that she assigns different utility functions to the states of survival and death. As our first contribution, we explicitly derive her optimal life-contingent payoff, influenced by mortality and financial risk, assuming that actuarially fair premiums for mortality risk are charged. However, we also show that if a risk loading for the mortality risk applies, the optimal life-contingent payoff can no longer be purchased. Instead, we propose, which is our second contribution, a peer-to-peer solution to approximate the optimal life-contingent payoff via a pool that delivers a proxy payout to each pool member. We show that if the pool is sufficiently large, the proxy payout converges almost surely against the optimal life-contingent payoff.

This is joint work with An Chen and Morten Wilke.

Speaker: Martino Grasselli (Università di Padova and Pole Universitaire Léonard de Vinci)

Title: Objective pricing of illiquid assets: a deep learning approach in the art market

Abstract: Illiquid assets, such as those in the art market, are difficult to price objectively, due to their lack of frequent transactions and market transparency. Traditional valuation methods often rely heavily on subjective judgment, leading to inconsistencies that complicate the situation in a market already characterized by a significant difference between price and value. However, the growing availability of large datasets in recent years has enabled the use of Deep Learning techniques to provide more objective and accurate price predictions for such assets. In this work, we combine Deep Learning methods with the Benchmark Approach to a case study in the art market, proving their potential to predict price and value in a more consistent and transparent manner. Our results highlight the effectiveness of the model in forecasting prices and provide insights into the price dynamics of illiquid assets over time. This approach offers a promising direction for improving pricing accuracy in markets where illiquidity poses a significant challenge.

This is joint work with D. Bassan, P. Vanni and F. Vinci.

Speaker: Mario Wüthrich (ETH Zurich)

Title: Observation-driven state-space models for experience rating

Abstract: For experience rating in insurance, one combines prior rating information with past claims experience. Classical approaches consider versions of the Bühlmann credibility model (1967). The Bühlmann credibility model is based on a static random effects assumption which leads to exchangeability of past claims. Intuitively, past claims should receive a seniority weighting, and state-space models of Kalman filter type have been proposed to solve this pricing problem, see, e.g., Pinquet-Guillen-Bolance (2001). In the domain of count data, a different model class has been studied by Harvey and Fernandes (1989). Unlike Kalman filter type models, the Harvey-Fernandes model is observation-driven meaning that there is a feedback loop from the observations to the state-space dynamics. We present an extension of the Harvey and Fernandes model for claims count modeling. This extension allows for different long term behavior, and it has tractable log-likelihood functions. We discuss this class of models, explain empirical Bayes' fitting, give credibility formulas, and show some numerical results.

This is joint work with Jaeyoun Ahn, Himchan Jeong and Yang Lu.