Colloquium on Risk Theory
In Honor of Hans Gerber's 80th Birthday

Tuesday, July 11, 2023

Salle Extranef 109, UniL

➘ **10 h 00** **Elias Shiu** (University of Iowa)
Actuarial Approach to Pricing Exotic Options

➘ **11 h 00** **J.K. Woo** (University of New South Wales, Sydney)
Valuing equity-linked insurance products for couples

➘ 11 h 30 LUNCH BREAK

➘ **13 h 30** **Eric C. K. Cheung** (University of New South Wales, Sydney)
Optimal periodic dividend strategies when dividends can only be paid from profits

➘ **14 h 00** **Nathaniel Smith** (La Mobilière)
From equality to inequality

➘ **14 h 30** **Georgios Pitselis** (University of Piraeus)
Credible Weighted Distribution

ABSTRACTS

E.S.W. Shiu: *Actuarial Approach to Pricing Exotic Options*

Abstract: Two time-honored concepts in actuarial science, Esscher transform and adjustment coefficient, can provide an efficient method for pricing financial options under the Black-Scholes framework. This talk will show how they can be used to price barrier options and immediate rebate options.

J.K. Woo: *Valuing equity-linked insurance products for couples*

Abstract: In practice, it is often convenient to assume that the lifetimes of different persons are independent. However, some results in the literature have demonstrated that the lifetimes of a couple typically exhibit positive dependence, and failure to take such dependence into account may lead to miscalculations of reversionary annuities for example.
Traditional equity-linked products are usually defined for a single life. It is well known that the evaluation of a product with a Guaranteed Minimum Death Benefit (GMDB) is related to the pricing of a put option on the underlying equity index with the expiry date being the policyholder's death time which is random. In this presentation, we explore the idea of evaluating equity-linked products specifically designed for a couple under the assumption that the lifetimes can be dependent. Results analogous to the single-life case are presented for some innovative joint life products. These include, for example, a product that provides the surviving spouse (upon the death of the income-earning spouse) with an annuity until his/her death, where the annuity payment can depend on the underlying equity index and its running maximum at the death time of the incoming-earning spouse. This helps guarantee the standard of living of the surviving spouse. This is joint work with E. Cheung and K. Tang.

Eric Cheung: *Optimal periodic dividend strategies when dividends can only be paid from profits*

Abstract: In this presentation, we consider the compound Poisson insurance risk model and analyze the optimal dividend strategy when dividends can only be paid periodically as lump sums. If one makes the usual assumption that dividends can be paid from the available surplus, then the optimal strategies are often of band or barrier type, resulting in a ruin probability of one (e.g. Albrecher, Bäuerle and Thonhauser (2011)). As opposed to such an assumption, we assume that a dividend can only be paid from a certain fraction of the profit (i.e. positive increment of the process between successive dividend decision times), and such a constraint allows the surplus process to have a positive survival probability. The Bellman equation and some properties of the optimal strategy are discussed. A candidate strategy is one that pays the highest possible dividend as long as the surplus is high enough. The expected present value of the dividend payments until ruin under the candidate strategy is subsequently derived. Via some numerical examples it can be checked that the dividend function satisfies the Bellman equation. This presentation is based on a working paper with Guo Liu, Jae-Kyung Woo, Jiannan Zhang, and Dan Zhu.

Nathaniel Smith: *From equality to inequality*

Abstract: In their article Equivalence principle and Jewell's inequality (published in the European Actuarial Journal 2/2021), using an elegant derivation and considering various general life insurance policies, Professors Hans U. Gerber and Elias S. W. Shiu take you from the equivalence principle to a seemingly surprising inequality. This result had already been pointed out by the late Professor William S. Jewell for a specific type of life insurance policy in 1980. This presentation seeks to illustrate the underlying result considering a single-premium life insurance policy.

Georgios Pitselis: *Credible Weighted Distribution*

Abstract: This article extends the results of Jewell (1974) of forecasting the distribution of individual risk in cases where the observations are weighted or are grouped in intervals. The credibility estimation is obtained by restricting the class of admissible functions, leading to the so-called linearized credibility results and the optimal projection theorem is also applied for credibility estimation. In addition, distribution credibility estimators are also established and numerical illustrations are herein presented. Two examples of distribution credibility estimation are given, one with insurance loss data and the other with industry financial data.

DÉPARTEMENT DE SCIENCES ACTUARIELLES
Faculté HEC
Université de Lausanne
1015 Lausanne
e-mail : dsa@unil.ch