L^2 ISFA Lyon and DSA-HEC Lausanne

Monday, June 14, 2021

ONLINE

▶ **9 h 45** **DIALING-IN and OPENING**

▶ **10 h 00** **Marcus Christiansen** (University of Oldenburg)
On the calculation of prospective and retrospective reserves in non-Markov models

▶ **10 h 45** Discussion by Andrey Ugarte (UNIL)

▶ **11 h 00** Phd talk #1: **Samuel Piveteau** (ISFA)
K-Lee-Carter clustering

▶ **11 h 20** Q&A's by UNIL PhD students

▶ **11 h 30** Networking Session

▶ **12 h 00** **LUNCH BREAK**

▶ **13 h 30** **Christian Robert** (ENSAE Paris)
Conditional mean risk sharing in the individual model with graphical dependencies

▶ **14 h 15** Discussion by Pierre-Olivier Goffard (ISFA)

▶ **14 h 30** Phd talk #2: **Aleksandr Shemendyuk** (UNIL)
Determinants of Institutional Long-Term Care of Dependent Elderly in Switzerland

▶ **14 h 50** Q&A's by ISFA PhD students

▶ **15 h 00** Phd talk #3: **Marwa Talbi** (ISFA)
Does economic policy uncertainty matter for the co-movements between precious metals and BRICS stock markets? A cross-quantilogram approach

▶ **15 h 20** Q&A's by UNIL PhD students

▶ **15 h 30** Phd talk #4: **Pavel Ievlev** (UNIL)
Parisian ruin probability for the many-inputs reinsurance process

▶ **15 h 50** Q&A's by ISFA PhD students

▶ **16 h 00** **CLOSING**
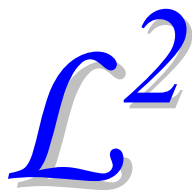
ABSTRACTS

Marcus Christiansen: *On the calculation of prospective and retrospective reserves in non-Markov models*

Abstract: Almost all life and health insurance models in the actuarial literature use either a Markov assumption or a semi-Markov assumption. This paper shows that non-Markov modelling is also feasible and presents suitable numerical and statistical tools for the calculation of prospective and retrospective reserves. A central idea is to base the calculation of reserves on forward and backward transition rates. Feasible estimators for the forward transition rates have been recently suggested in the medical statistics literature. This paper slightly extends them according to insurance needs and newly introduces symmetric estimators for backward transition rates. Only few adjustments are actually needed in the classical insurance formulas when switching from Markov modelling to as-if-Markov evaluations in order to avoid model risk.

Samuel Piveteau: *K-Lee-Carter clustering*

Abstract: We propose a method named the K-Lee-Carter model allowing us to cluster different mortality time series. This method produces K different groups on which the applications of the Lee-Carter model leads to the minimization of the mean squared errors. While this algorithm may appear to be complex, we demonstrate that it is actually a particular case of the usual K-centroids approach, with a specific distance function. This equivalence makes the implementation easier and faster, using standard software and packages. Two variations of this method are proposed to overcome the potential erratic results and add expert judgments: the constrained and the penalized K-Lee-Carter model. We provide two applications: the first one the US population by age and sex and the second on the US female population clustered by cause of death and age. In each case, we observe that the K-Lee-Carter model generates, for the same number of groups, better results than the usual arbitrary clusters.

Christian Robert: *Conditional mean risk sharing in the individual model with graphical dependencies*

Abstract: Conditional mean risk sharing appears to be effective to distribute total losses among participants within an insurance pool. This paper develops analytical results for this allocation rule in the individual risk model with dependence induced by the respective position within a graph. Precisely, losses are modeled by zero-augmented random variables whose joint occurrence distribution and individual claim amount distributions are based on network structures and can be characterized by graphical models. The Ising model is adopted for occurrences and loss amounts obey decomposable graphical models that are specific to each participant. Two graphical structures are thus used: a first one to describe the contagion among member units within the insurance pool and a second one to model the spread of losses inside each participating unit. The proposed individual risk model is typically useful for modeling operational risks, catastrophic risks or cyber security risks.

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ISFA Lyon and DSA-HEC Lausanne

Aleksandr Shemendyuk: *Determinants of Institutional Long-Term Care of Dependent Elderly in Switzerland*

Abstract: Long-term care financing is of increasing interest due to demographic changes and the aging population in many countries. Since many care-intensive conditions begin to manifest at higher ages, assessing the financial costs, the infrastructure, and the number of qualified personnel becomes an essential component in understanding such care. To evaluate these costs and needs, the overall burden of institutional care can be derived from the duration of stay in dependence and the intensity of help provided to the elderly for their activities of daily living. This article aims to model these two aspects using novel longitudinal data from nursing homes in the canton of Geneva in Switzerland. Our data contains comprehensive health and care information, including physical and psychological impairments, levels of dependence, and pathology, on about 21 000 individuals. On the one hand, we build an accelerated failure time model to study the influence of selected factors on the duration of care. On the other hand, a beta regression model describes the intensity of care. Our main findings show that apart from age and gender, the duration is mainly affected by the pathology and number of different diagnoses. At the same time, the intensity of care is driven by the individual level of dependence and specific limitations. Using both evaluations, we simulate the total care burden for individual profiles. Our study sheds light on the relevant physical and psychological health indicators that need to be accounted for, not only by the providers of institutional care but also, e.g., by the government when setting up care policies and insurance companies for the pricing of long-term care cover.

Marwa Talbi: *Does economic policy uncertainty matter for the co-movements between precious metals and BRICS stock markets? A cross-quantilogram approach*

Abstract: Economic policy uncertainty (EPU) has relevant implications for financial markets. To assess for these implications, this paper aims to investigate how the EPU drives the quantile dependence between precious metals and BRICS stock markets. Applying the cross-quantilogram approach, developed by Han et al. (2016), our results lead to the same findings when controlling or not for the EPU. Indeed, we provide evidence that gold is a perfect hedge in Russia and India. While silver and platinum may be seen as hedge assets only in the China stock market. Adding to that, over the entire sample period, we find that extreme negative stock market returns were followed by extreme positive gold returns for all stock markets except for Brazil and China. Hence, gold is not a safe haven in these stock markets. However, silver is a safe haven only in China stock market and platinum is a safe haven in China and South Africa stock markets.

Pavel Ievlev: *Parisian ruin probability for the many-inputs reinsurance process*

Abstract: Consider the proportional reinsurance process with two (or more) companies sharing one risk process, modeled by large sums of independent Brownian motions. There are recent results on classical, joint and "at least one" ruin for this process, whereas the Parisian ruin seems to have not been studied before. In the talk I shall address the problem of finding the exact first order asymptotics in this case. The problem is motivated by the paper "Proportional reinsurance for fractional Brownian motion risk model" by Krzysztof Kepczynski.