L^2 ISFA Lyon and DSA-HEC Lausanne

Wednesday, June 3, 2020

O N L I N E

〰	9 h 45	DIALING-IN and OPENING

https://univ-lyon1.webex.com/univ-lyon1-en/j.php?MTID=m04e8b90f473f750e9c0f714d3ed42bc6
Meeting number (access code): 230 077 405   Meeting password: sqYNmTCP695

〰 **10 h 00**   **Alfred MÜLLER** (University of Siegen)
Dependence uncertainty bounds for the energy score and the multivariate Gini mean difference

〰 **10 h 45**   Discussion by Dina FINGER (UNIL)

〰 **11 h 00**   Phd talk #1: **Arthur Maillart** (ISFA)
Towards an explainable Machine Learning model for claim frequency

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

〰 **11 h 30**   Networking Session

〰 12 h 00   LUNCH BREAK

https://univ-lyon1.webex.com/univ-lyon1-en/j.php?MTID=ma851134b92972745d43de906d38f0d84
Meeting number (access code): 236 837 159   Meeting password: 3tSVeseKW43

〰 **13 h 30**   **Gerhard Stahl** (Thalanx and University of Hannover)
Model Uncertainty in a Holistic Perspective

〰 **14 h 15**   Discussion by Nabil KAZI-TANI (ISFA)

〰 **14 h 30**   Phd talk #2: **Leonard Vincent** (UNIL)
Using the relative performance of a ceding insurance company into a contingent reinsurance treaty

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

〰 **15 h 00**   Phd talk #3: **Morgane Plantier** (ISFA)
Individual trade-off between insurance and self-protection: An experimental study

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

〰 **15 h 30**   Phd talk #4: **Andrey Ugarte** (UNIL)
Can Long-Term Care Insurance Emerge in Switzerland? Depicting the Characteristics of Potential Buyers to Understand Overall Demand

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

〰 **16 h 00**   CLOSING
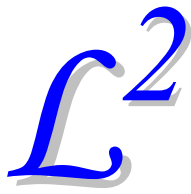
ABSTRACTS

Alfred MÜLLER: *Dependence uncertainty bounds for the energy score and the multivariate Gini mean difference*

Abstract: 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. The talk is based on joint work with Carole Bernard (Grenoble) and Marco Oesting (Siegen).

Arthur Maillart: *Towards an explainable Machine Learning model for claim frequency*

Abstract: In this paper, we propose an explainable Machine Learning approach to model the claim frequency of a telematics car dataset. Since the beginning of the enthusiasm for Machine Learning in insurance, esearch focused on performance and showed promising improvements. Nevertheless, in companies, these methods are considered as Black Boxes and often do not come out of the sandbox. In order for these models to take their place in insurance companies, it seems important that the decision makers understand what has been learnt by these last to accept them. Indeed, it is hard to blindly follow the prediction of a Black Box. Thus, we present a method to build a tree that faithfully synthesises the predictions of an Additive Tree Model (ATM) such as those derived from the Random Forest or Gradient Boosting. This tree is a global explanation of the predictions of the Black Box. Thanks to this surrogate model, we can extract knowledge from a Black Box ATM and integrate new relationships in a GLM for example. We illustrate this on a telematics dataset collected for an experiment on a Pay As You Drive (PAYD) product from a Belgian insurance portfolio.

Leonard VINCENT: *Using the relative performance of a ceding insurance company into a contingent reinsurance treaty*

Abstract: Many reinsurance companies offer contingent reinsurance treaties, under which the indemnification scheme depends on a random event whose realization may have adverse financial consequences for the ceding insurance company. Treaties of this kind have the purpose to increase the
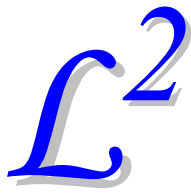
efficiency of reinsurance by focusing it on the cases where the cedent really needs it. In this paper, we study the consequences of making the extent of a reinsurance cover depend on the occurrence of a bad performance of the cedent - in terms of loss ratio - relatively to the one of its competitors. The motivation for this is many-fold. For the cedent, a bad relative performance can put it into a financial distress, and the related costs may justify its need of an extended cover. Also, if the cedent finds a positive association between the occurrence of a bad performance and the riskiness of its loss distribution, then using the former to adapt the indemnification scheme will clearly serve the purpose of contingent reinsurance. Finally, since the worse the relative performance of a particular cedent is, the better the ones of its competitors will be, then a reinsurance company selling treaties of this kind to several competitors will benefit from some degree of hedging.

Gerhard STAHL: *Model Uncertainty in a Holistic Perspective*

Abstract: This paper focuses on model uncertainty within a holistic perspective. The latter is characterized by a consistent approach to risk measurement by combining stochastic, economic, operational and regulatory elements. This paper is a plea to account for model uncertainties on the level of consequences and not at the level of risk factors. This has important implications for validation, auditing and is of use testing of internal models. In line with risk management approaches, uncertainties have to managed. The starting point for this process is the identification and measurement of uncertainties. To achieve this goal further specific criteria for validity and resilience, are introduced in this paper. Examples from real world internal models highlight the practical relevance of the introduced concepts. A concluding section summarizes the main insights.

Morgane Plantier: *Individual trade-off between insurance and self-protection: An experimental study*

Abstract: This paper reports results from an experimental study that investigates individual risk management behaviors in situations where risk management tools available can differ. We propose an original lab-experiment to reexamine the individual trade-off between insurance and self-protection from an empirical perspective in a controlled environment. Our experimental results show that insurance choices may depend on the presence of another risk management tool, the self-protection option. The estimate results of this study also reveal a strong moral hazard effect of insurance on self-protection effort. In addition, it would appear that the type of insurance contract could influence the individual decisions in terms of preventive activities. Individuals invest more in self-protection when the insurance contract is imposed than when they can choose the insurance coverage themselves. These experimental results provide support for theoretical predictions related to risk management decisions with self-protection option, and have implications for some insurance markets.
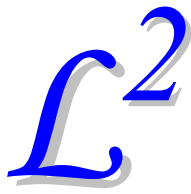
L² ISFA Lyon and DSA-HEC Lausanne

Andrey UGARTE: *Can Long-Term Care Insurance Emerge in Switzerland? Depicting the Characteristics of Potential Buyers to Understand Overall Demand*

Abstract: As the risks associated to aging start to materialize, societies become more aware of their financial and social consequences, and the importance of Long-Term Care Insurance (LTCI) becomes evident. In this context, although this type of coverage is already developed in some countries, in the case of Switzerland barely no offer of such products exists, and the lack of knowledge about their potential persists. To tackle this issue, this research aims to identify the main determinants that could trigger the interest of individuals to purchase LTCI. Through the development of models that combine both a Classical Statistical Framework and more recent Machine Learning techniques, and in order to better comprehend the possible market characteristics of such a product, the paper attempts to present a depiction of a potential purchaser of LTCI based on economic, social, demographic, and political factors, among others. To achieve this, the main information source consists of a unique survey specially designed to shed some light on what Swiss residents think about aging, and their experiences dealing with dependence. As it will be shown, specific factors related to their experience and understanding about LTCI coverage turn out to be very relevant when discarding or not the purchase of these products, as the socio-economic factors play a second role in their decision-making process.