

ISFA Lyon et ISA-HEC Lausanne

Lundi 19 et mardi 20 juin 2017

à l'**I.S.F.A.**

Amphi G1

Lundi 19 juin 2017

- ⌘ **12 h 00**
Déjeuner (Extérieur ou 2204)

- ⌘ **14 h 00**
Anca JIJIE
« *Optimal Mix between Terminal Funding and Fully Funded Systems* »

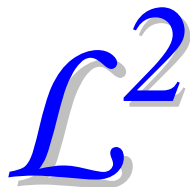
- ⌘ **14 h 45**
Nabil KAZI-TANI
« *Three points suffice* »

- ⌘ **15h 30**
Pause

- ⌘ **16 h 00**
Michel FUINO
« *Long-Term Care Models and Dependence Probability Tables by Acuity Level: New Empirical Evidence from Switzerland* »

- ⌘ **16 h 45**
Weihong NI
« *On the discounted penalty function when premium rates vary according to multi-period surplus increments* »

- ⌘ **17h30 Fin**



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Mardi 20 juin 2017

- ⌘ **9 h 00**
Accueil café (Hall)

- ⌘ **9 h 30**
Quentin GUIBERT
« *R package SimBEL: Calculate the best estimate in life insurance with Monte-Carlo techniques* »

- ⌘ **10 h 15**
Maïssa TAMRAZ
« *Some mathematical aspects of price optimisation* »

- ⌘ **10 h 45**
Arian CANI
« *On randomized reinsurance contracts* »

- ⌘ **11 h 15**
Pause café (Hall)

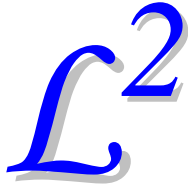
- ⌘ **11 h 45**
Claire MOUMINOUX
« *Experimental evidence on Insurance Demand with Multiple Distribution Channels* »

- ⌘ **12 h 15**
Maximilien BAUDRY
« *Kaggle competition Quora: Winning solution* »

- ⌘ **12 h 45**
Déjeuner (Extérieur ou 2204)

- ⌘ **14 h 15**
Eleni VATAMIDOU
« *Approximations and error bounds for risk measures* »

- ⌘ **14 h 45**
Pierrick PIETTE
« *Mortality rates forecasting with high-dimensional Vecteur-AutoRegression* »



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⌘ 15 h 15

Laura GAY

« *Parameter estimation for an Ornstein-Uhlenbeck process* »

⌘ 15h45 Café et discussions

ABSTRACTS

Speaker : Anca JIJIE (Université de Lausanne)

Title : « Optimal Mix between Terminal Funding and Fully Funded Systems »

Abstract : The current trend within the public pension funds in Switzerland is to pass from a mixed system (combining a terminal funding component and a fully funded component) to a fully funded one, even with the interest rates falling considerably in the last few years. One question that arises is what would be the optimal for the retired cohorts: having a pure terminal funding system, a pure funded system or rather a mix between the two? This paper attempts to answer this exact question, by allowing the total contribution paid by individuals to be divided between the two types of systems, such that, under given constraints, the social planner's welfare function is maximised. We show that the optimal mix depends greatly on the choice of the discount factor of future generations, as well as on the risk aversion coefficient of pensioners. Under certain combinations of parameters, a pure system, be it terminal funding or fully funded, is not optimal anymore. Instead, it is preferable to keep a percentage $\alpha \in (0; 1)$ in the terminal funding system and assign the rest of $1 - \alpha$ to the fully funded component.

Speaker : Quentin GUIBERT (LoLitA – SAF, Université Lyon 1)

Title : « R package SimBEL: Calculate the best estimate in life insurance with Monte-Carlo techniques »



INSTITUT DE SCIENCE FINANCIERE ET D'ASSURANCES

Domaine Scientifique de Gerland

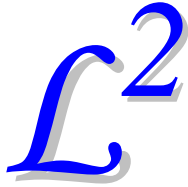
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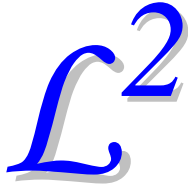
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Abstract : Under the Solvency II regime, the market-consistent value of life insurance liabilities is determined by calculating a best estimate as the expected present value of future payments generated by insurance contracts. This calculation considers financial options and guarantees included in the insurance obligations, and future management actions. In particular, the profit sharing mechanism of the insurance portfolio is one of the key elements of this modeling. However, developing a valuation approach for this purpose is difficult as this requires specific models for a joint projection of assets and liabilities, including lots of management and contractual rules. We propose the SimBEL package in R for the valuation and the analysis of the best estimate related to a portfolio of euro-denominated savings contracts with profit participation, which are the most common product on the French insurance market. This package uses Monte-Carlo simulation techniques and covers the main steps of the analysis of a such valuation model, in a manner similar to commercial software commonly used by actuaries. It requires providing insurance data and the output of an economic scenario generator with a standard data format, and can be used to compute the main shocks defined by the standard formula, as it includes functions dedicated to data preparation for this purpose. This presentation aims to describe the framework behind this package, its usage and some implementation details.

Speaker : Michel FUINO (Université de Lausanne)

Title : « Long-Term Care Models and Dependence Probability Tables by Acuity Level: New Empirical Evidence from Switzerland »

Abstract : Due to the demographic changes and population aging occurring in many countries, the financing of long-term care (LTC) poses a systemic threat. The scarcity of knowledge about the probability of an elderly person needing help with activities of daily living has hindered the development of insurance solutions that complement existing social systems. In this paper, we consider two models: a frailty level model that studies the evolution of a dependent person through mild, moderate and severe dependency states to death and a type of care model that distinguishes between care received at home and care received in an institution. We develop and interpret the expressions for the state- and time-dependent transition probabilities in a semi-Markov framework. Then, we empirically assess these probabilities using a novel longitudinal dataset covering all LTC needs in Switzerland over a 20-year period. As a key result, we are the first to derive dependence probability tables by acuity level, gender and age for the Swiss population. We discuss significant differences in the transition probabilities by gender, age and duration. Using sociodemographic covariates,



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we reveal the importance of household composition and geographical region of residence for selected transitions.

Speaker : Weihong NI (University of Hong Kong)

Title : « On the discounted penalty function when premium rates vary according to multi-period surplus increments »

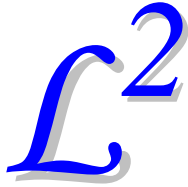
Abstract : We work with the discounted penalty function for a dependent risk model. When the risk surplus process is observed at random periods, we let premium rates vary according to the levels of increments over the past observation intervals. This paper first generalises the results in [2] when the random review times are Erlang (n) distributed. Then instead of simply considering the signs of increments, we extend the dependence based on specified intervals of surplus increments. We also analyse the situation when increments observed in multiple past observation periods affect premium rates. Gerber-Shiu functions under different states represent the process starting with various premium rates. They are derived via a system of integral equations. Through directly applying results obtained in [1], we compute the Gerber-Shiu functions explicitly.

Speaker : Nabil KAZI-TANI (ISFA – SAF, Université Lyon 1)

Title : « Three points suffice »

Abstract : We consider the problem of optimally stopping a continuous-time Markov process with a stopping time satisfying a given expectation constraint. We first reformulate the problem as a linear optimization problem, over a set of probability measures satisfying some moment constraints. To do so, we extend the balayage approach of Chacon and Walsh to the Skorokhod embedding problem for general Markov processes. This also allows us to reduce the optimization over a set of atomic measures. Our main result is the following: it is sufficient to consider stopping times such that the stopped process has a law that is a weighted sum of 3 Dirac measures. In other words: stopping at three points is enough. Several examples will illustrate that result.

This is a joint work with Stefan Ankirchner (University of Jena), Maike Klein (University of Jena) and Thomas Kruse (University of Duisburg-Essen).



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Speaker : Maïssa TAMRAZ (Université de Lausanne)

Title : « Some mathematical aspects of price optimisation. »

Abstract : Calculation of an optimal tariff is a principal challenge for pricing actuaries. In this contribution we are concerned with the renewal insurance business discussing various mathematical aspects of calculation of an optimal renewal tariff. Our motivation comes from two important actuarial tasks, namely a) construction of an optimal renewal tariff subject to business and technical constraints, and b) determination of an optimal allocation of certain premium loadings. We consider both continuous and discrete optimisation and then present several algorithmic suboptimal solutions. Additionally, we explore some simulation techniques. Several illustrative examples show both the complexity and the importance of the optimisation approach.

Speaker : Arian CANI (Université de Lausanne)

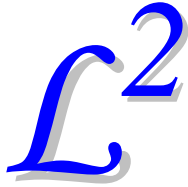
Title : « On randomized reinsurance contracts »

Abstract : The design of optimal reinsurance treaties is a classical problem in risk theory. The identified optimality results are then typically based on a deterministic reinsurance rule. In the framework of a one-year reinsurance model including regulatory solvency constraints and the associated cost of capital, in this paper we propose a randomized stop-loss reinsurance strategy and investigate the effects of randomizing on the expected profit after reinsurance. We provide an analytical characterization of the resulting optimal stop-loss retention level. The proposed randomized strategy turns out to outperform the classical deterministic strategy in a number of cases.

Speaker : Claire MOUMINOUX (ISFA – SAF, Université Lyon 1)

Title : « Obfuscation and Trust: Experimental evidence on Insurance Demand with Multiple Distribution Channels »

Abstract : This paper aims at shedding light on the dilemma of the insurance consumer: should she is self-confident facing an important set of insurance policies or rather trust an intermediary who assists her decision making, according to different decision designs based on different distribution channels with different information frames. The results show that trust level is the main determinant of distribution channel choices while the obfuscation of



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information is a main inefficiency source of the decision making particularly determinant on the insurance characteristics of contracts chosen by consumers.

Speaker : Maximilien BAUDRY (ISFA – SAF, Université Lyon 1)

Title : « Kaggle competition Quora: Winning solution »

Abstract : Kaggle and Quora recently hosted a prediction competition which gathered more than 3300 teams. The aim was to predict if question pairs are duplicated or not. Working on such a problematic need specific tools to make statistics on text, such as NLP (Neuro Linguistic Programming), Deep Learning with state of the art architectures, and graphical features. This competition's winners presents their solution and the tools they used to make such a performance.

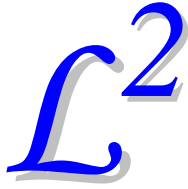
Speaker : Eleni VATAMIDOU (Université de Lausanne)

Title : « Approximations and error bounds for risk measures »

Abstract : A compromise between tractability and accuracy typically comes along with the formulation of models for insurance risk. Explicit formulas for particular quantities of interest are available for certain simple models, but in many cases, the latter build on the assumption that random variables (e.g. claim sizes in the insurance context) have exponentially bounded tails. However, heavy-tailed models turn out to be better descriptors of the observed behaviour because light-tailed models often under-estimate significantly the occurrence of large losses. Such heavy-tailed risk models are in principle much harder to analyse, and analytical formulas are commonly obtained for very simple examples. In this context, approximations can be a helpful tool, but assessing the accuracy of such approximations is crucial for their applicability. Using as a vehicle the classical Cramér-Lundberg model, I will demonstrate in this talk how to derive accurate approximations for ruin probabilities and their accompanying error bounds. These approximations are constructed on the basis of phase-type distributions and their main characteristics are outlined. Finally, generalisations of these techniques are discussed for more general Lévy processes and their associated performance measures.

Speaker : Pierrick PIETTE (ISFA – SAF, Université Lyon 1)

Title : « Mortality rates forecasting with high-dimensional Vecteur-AutoRegression »



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Abstract : The mortality rates forecasting problem involves the analysis of high-dimensional time series, especially in multi-populations modelling. Most of usual mortality models propose to decompose the mortality rates into several latent factors to reduce this complexity. These approaches, in particular those used cohort factors, have a good fit, but they are less reliable for forecasting purpose. One of the major challenges is to determine the spatial-temporal dependence structure between mortality rates given a relative moderate sample size. This paper proposes a large vector autoregressive (VAR) model fitted on the differences in the log-mortality rates, ensuring that the existence of long-run relationships between the mortality rates improvements. Our contribution is threefold. First, sparsity when fitting the model is ensured by using high-dimensional variables selection techniques without imposing arbitrary constraints on the dependence structure. The main interest is that the structure of the model is directly driven by the data, in contrast to the main mortality forecasting models. Additionally, our estimation allows a one-step process, as we do not need to estimate hyper-parameters. The variance-covariance matrix of residuals is then estimated through a parametric form. Secondly, our approach can be used to detect no intuitive age dependence in the data, beyond the cohort effect which is captured by our model. Third, our approach is natural to model the several populations in long run perspectives. Finally, in an out-of-sample forecasting study for mortality rates, we obtain a significant performance increasing when compared to classical mortality models using the French, US and UK data. We also show that our results enlighten the so-called cohort effect for these populations.

Speaker : Laura GAY (ICJ, Ecole Centrale de Lyon)

Title : « Parameter estimation for an Ornstein-Uhlenbeck process »

Abstract : The dynamics of temperature can be modelled by a mean-reverting process such as an Ornstein-Uhlenbeck process. We want to estimate the parameters of this process thanks to daily observed suprema of temperatures. This estimation will allow us to estimate risk measures, such as the probability of heatwave. Our analysis is based on the cumulative distribution function of the supremum. The parameters are estimated by a least square method quantiles. We perform the estimation thanks to a genetic algorithm.