RÉSUMÉS - ABSTRACTS

9:30-10:10 Alain Desgagné, Université du Québec à Montréal
Conflicting information and scale parameter inference: application to the calculation of premiums

The use of heavy-tailed distributions is a valuable tool in developing robust Bayesian procedures, limiting the influence of conflicting information on posterior inference. In this paper, the behavior of the posterior density of a scale parameter is investigated when the sample contains outliers or the prior scale is misspecified, for positive observations. Conditions on the tails of the prior and the likelihood are established to determine the proportion of conflicting information that can be rejected by the posterior. It is shown that the posterior distribution converges in law to a density proportional to the product of the densities of the nonconflicting information, as the outliers (and/or the prior scale) go to zero or infinity, at any given rate. In particular, if the prior is non-conflicting, this limiting density is the posterior that would be obtained from the reduced sample, excluding the outliers. An example of calculation of a pure premium is given. We compare the log-normal model with the robust super heavy-tailed (log-Pareto type) distributions model.
Joint work with Jean-François Angers, Université de Montréal

10:10-10:50 Amin Hassan Zadeh, Université de Montréal
Parameter estimation of bivariate phase-type distributions via EM algorithm

Phase-type distributions can play an important role in actuarial science and finance due to some of their intrinsic properties, especially due to the fact that they are dense in all positive distributions. On the other hand, they do have certain disadvantages. For example, since it involves the use of exponential of matrices, estimation of parameters in this context is not an easy task. In this talk, the estimation of parameters in the bivariate case of phase-type distributions via EM algorithm will be considered. In most cases, the algorithm converges to a stable matrix and vector in less than four iterations. Potential developments in this field of research will also be discussed.

10:50-11:30 Charles Dugas,Université de Montréal
Exact bootstrap of vertically averaged ROC curves

Model selection often involves out-of-sample testing of a series of trained models. In order to alleviate some of the dependence on the chosen testset, bootstrap resampling of the testset is sometimes used as a means to provide robustness to the model selection process. We derive exact bootstrap estimates for ROC curves, a performance measure prevalent in the machine learning and data-mining communities. Focus is put on vertical averaging of bootstrap samples that is appropriate when a fixed false positive rate, rather than a score threshold, is to be determined by the operator. In the field of insurance, applications include risk sharing pools, direct marketing, fraud detection and underwriting.

13:30-14:10 Cody Hyndman, Concordia University
Forward-backward stochastic differential equations in term-structure modelling

We consider forward-backward stochastic differential equations (FBSDEs) that characterize certain models of the term structure of interest rates and associated derivatives. Numerical methods for the solution of the FBSDEs based on Monte-Carlo simulation and nonparametric regression are applied to price and hedge various derivatives.

14:10-14:50 Lars Stentoft, HÉC Montréal
Option Pricing when the Volatility of Financial Asset Returns is modelled with the Normal Inverse Gaussian distribution

In the present paper, the Normal Inverse Gaussian distribution is used in a GARCH framework to model the return on three large US stocks. In this way a general framework able to accommodate skewness and leptokurtosis as well as the time varying volatility often found in financial data is obtained. The model is estimated on return data from 1976 through 1995 which supports the extensions compared to the standard GARCH framework with Gaussian innovations. The NIG GARCH model is then used for option pricing purposes. In order to do this special approximation procedures need to be developed. The paper details how such approximations can be obtained efficiently, and through a Monte Carlo study it is shown that the NIG GARCH model can explain some of the systematic pricing errors found in recent empirical work on option pricing with time-varying volatility. Based on this observation a large scale empirical examination is performed, which provides evidence favouring the NIG GARCH model over the Gaussian alternative when pricing options on the stocks. In particular, improvements are found for out of the money options and for short maturity options. Since options with these characteristics are among the most traded this extension is important.

15:10-15:50 Patrice Gaillardetz, Concordia University
Pricing Equity-Indexed Annuities Using Dynamic Risk Measures

In this talk, we consider the pricing of equity-indexed annuities using dynamic risk measures and present dynamic hedging strategies underlying these valuations. Since these products involve mortality as well as financial risks, we combine the actuarial and financial approaches to protect insurance companies against the unhedgeable mortality risk. First, dynamic risk measures (eg. iterated CTE or VaR) are used to determine loaded premiums for equity-indexed annuities. These risk measures are applied recursively and take into account all intermediate capital requirements. Then, using the arbitrage-free theory we seek martingale mortality probabilities such that the fair value of the contract is equal to the capital requirement at time 0. Hence, given the martingale probabilities we can extract the underlying dynamic hedging strategy for the equity-linked products. However, these replicating portfolios are based on certain assumptions and produce discrete hedging errors since the underlying hedging strategies are not self-financing. Thus, the different risk measures will be compared using their respective hedging errors.

15:50-16:30 Yafang Wang, Concordia University
On the distribution of compound renewal sums with discounted claims

We discuss the moment generating function (m.g.f.) of a compound present value aggregate claims. In particular, we study Phase-type (PH) discounted claims under the net interest assumption $\delta \geq 0$, which is a generalization of classical risk model $\delta = 0$. A closed form for the m.g.f. of a compound sums with PH discounted claims is obtained. We also consider the compound renewal sums and get homogeneous differential equations for the m.g.f. with PH discounted claims. Applications and some numerical examples are given to explain the results.
Joint work with Jose Garrido, Concordia University and Ghislain Léveillé, Université Laval