2011

University of Piraeus
Department of Statistics & Insurance Science
http://stat.unipi.gr/workshops/

Actuarial Science & Risk Measures Workshop

2nd Actuarial Day

Invited Speakers:

- **Jan Dhaene** *(University of Leuven)*
- **Raluca Vernic** *(Ovidius University of Constanta)*
- **Manuel Morales** *(Universite de Montreal)*
- **Andrei Badescu** *(University of Toronto)*
- **Neyko Neykov** *(Bulgarian Academy of Sciences)*

Organizers:

Department of Statistics and Insurance Science of the University of Piraeus.

Insurance Training and Examinations Committee, Ministry of Economy.

Chairman*: *Georgios Pitselis *(University of Piraeus)*

Place:

University of Piraeus,
80 Karaoli & Dimitriou Str.
Conference Room

Date:

Opening: 09:30
Saturday 14 of May 2011

Free Admission

No prior registration is needed.

University of Piraeus | 80 Karaoli & Dimitriou Str | Conference Room

Saturday 14/05/2011 & 09:30

U N I V E R S I T Y O F P I R A E U S
DEPARTMENT OF STATISTICS AND INSURANCE SCIENCE

Actuarial and Risk Measures
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Program (List of Abstracts)

Some model-free results on pricing and hedging index options

Jan Dhaene
University of Leuven

Time 9:30-10:15

We consider a financial market consisting of a risk-free bank account and n (dividend-paying) stocks. In this market, options on these stocks as well as options on the corresponding index (i.e. on the weighted average of these stocks) are traded. Using the concepts of comonotonicity and (increasing) convex order, we derive an upper bound for a European-type call option on the index, in terms of the observed plain vanilla European calls on the individual stocks. This upper bound is shown to correspond to the price of the cheapest strategy in a broad class of super-replicating strategies for the index option. Moreover, this upper bound turns out to be least upper bound for the index option in the class of all models that are consistent with the observed plain vanilla option prices. We consider both the infinite market case (where plain vanilla options are traded for all strikes) and the more realistic finite market case (where only a finite number of vanilla options are traded per strike). The presented results are model-free in the sense that that the derived upper bound and the corresponding super-replication investment strategy are only based on the observed plain vanilla option prices in the market, without making an assumption on the stock price dynamics. The presented results can be used to define a model-free measure for the herd behavior in stock markets.

Risk capital decomposition based on the Conditional Tail Expectation for some multivariate models

Raluca Vernic
Ovidius University of Constanta
Time 10:15-11:00

An insurance company must be able not only to evaluate the total appropriate amount of capital needed to cover its aggregate loss, but also to fairly allocate this capital among its various lines of business. This last problem is known as the capital allocation problem. Risk measures are well-known tools used to determine the capital amount that has to be allocated to each business line. One of the most popular such risk measure is the Conditional Tail Expectation (CTE). CTE describes the expected amount of risk that can be experienced given that the risk exceeds a threshold value, providing an important measure of the right-tail risk. In this talk, we present CTE formulas for the multivariate skew-normal distribution and for the multivariate Pareto distribution of the second kind. Moreover, as a numerical illustration, we also present the results of a study on a set of bivariate real data from auto insurance (third party liability and bodily injury). In this study, we considered several continuous bivariate distributions: the normal, lognormal, and, motivated by the skewness of the data, the skew-normal with the alternative log-skew-normal. Looking for a better fit, we also considered a bivariate nonparametric transformed kernel density. Numerical results on the real data are discussed and compared.

A two-dimensional risk model with proportional reinsurance

Andrei Badescu
University of Toronto
11:30-12:15

In this talk, we consider an extension of the two-dimensional risk model introduced by Avram et al. (2008). To this end, we assume two insurers in which the first is subject to claims arising from two independent compound Poisson processes. The second insurer that can be viewed as a different line of business of the same insurer or as a reinsurer covers a proportion of the claims caused by one of these two compound Poisson processes. The Laplace transform of the time until at least one insurer is ruined is derived when the claim sizes follow a general distribution. The surplus level of the first insurer when the second one is ruined first is discussed in the end in connection with a few open questions.

On the Ruin Problem for General Insurance Risk Processes: An Overview

Manuel Morales
Universite de Montreal
12:15-13:00

Expressions for the expected discounted penalty function now exist for a wide range of models, in particular for a general class of Levy insurance risk processes [Biffis and Morales (2010) and Biffis and Kyprianou (2010)]. Indeed, the EDPF encapsulates relevant information about ruin related quantities that are of potential interest in risk management applications. Yet, in order to realize this potential, two main conditions are needed. First, these expressions must be computationally tractable enough as to allow for the evaluation of associated risk measures such as VaR or CVaR. Second, the models themselves must account for different levels of complexity as found in real applications. Now, most of the models studied so far

offer few interesting examples for which computation of the associated EDPF can be carried out to the last instances where evaluation of risk measures is possible. Moreover, currently available Levy risk insurance models refer to an over-simplified reality accounting only for premium in-flow and claims out-flow. In this talk we address these two issues with two different models. First, we introduce examples of risk insurance processes for which numerical evaluation of the EDPF can be readily implemented. Second, we discuss a Markov additive risk model that accounts for the possibility of background long-term market conditions. Some numerical illustrations will be presented.

Robust fitting of GLMs, regression quantiles and extremes through trimmed likelihood estimator

Neyko M. Neykov,
Bulgarian Academy of Sciences

13:00-13:45

The talk will be dedicated to robust statistical modelling based on trimming. It will be illustrated by examples based on real and simulated datasets. The focus would be on the estimators based on trimming introduced by Vandev and Neykov (1998) and the corresponding R package tlemix developed by Neytchev and Filzmoser (2008). Special attention will be given to these estimators within the frameworks of generalized linear models (Muller and Neykov, 2003), linear quantile regression (Koenker, 2005) and extreme value distributions (Neykov et al. 2005). The small sample performance of these estimators through a simulation study will be considered.