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## Probability II

Chair: Hao Yu (University of Western Ontario)

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**HASSAN OMIDI FIROUZI**, Université de Montréal

*Capital Allocation Problem for a New Ruin-Based Coherent Risk Measure*

This paper deals with one application of a ruin-based coherent risk measures to a basic problem of finance so called capital allocation problem. In this paper, we introduce a ruin-based coherent risk measure on the space of stochastic processes. As an application, we apply this risk measure to find the allocated capital for an insurer's surplus. In fact, we find that the capital allocation problem for this risk measure has a unique solution determined by Euler allocation method.

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**CLARENCE D. KALITSI**, Brock University

*Approximate Sampling Distributions of the Parameter Estimators in the AR(1)-Model*

We consider the first order auto-regressive model defined by  $X_{i+1} = \rho X_i + \epsilon_{i+1}$ . Based on a fully analytical approach, we demonstrate how to obtain the first four moments of some well-known estimators of  $\rho$ . This enables us to utilize the Edgeworth series to approximate the corresponding sampling distributions, which vastly improves that of the central limit theorem. More importantly, the resulting approximate sampling distributions perform very well even when the sample size is relatively small. In the case of the maximum likelihood estimator  $\hat{\rho}_M$ , we further show how this technique can be extended to higher order auto-regressive models.

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**JINGYA LI**, University of Western Ontario

*Valuation of Contingent Capital Bonds in First-Passage Structural Models*

Contingent capital bonds (CCB) are bonds that convert to common shares when a certain predetermined trigger is breached. We use a first-passage structural model to price CCBs based on a capital structure including deposit, equity, and senior and subordinated debt. Under infinite maturity, we derive a closed-form formula for the CCB's fair price and discuss how various factors affect issuing institution's contingent capital cost. Additionally, simulations confirm that broad conclusions drawn in the perpetual case also hold in the finite-maturity case. All the numerical experiments are based on real data and parameters that are calibrated to Canadian banks.

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**VAHED MAROUFY**, University of Waterloo

*Computational Aspects of Inference in Local Mixture Models*

Local Mixture Models (LMM) give a inferentially tractable but still flexible alternative to full mixture models. The parameter space naturally includes boundaries of different sorts. These boundaries mean that computing the maximum likelihood estimate (MLE) is not standard. This talk shows how the geometry of ruled and developable surfaces enable fast and efficient algorithms for finding the MLE to be developed.

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**HARSHA PERERA**, Simon Fraser University

*Declaration Guidelines in Test Cricket*

This project considers the decision problem of when to declare during the third innings of a test cricket match. There are various factors that affect the decision of the declaring team including the target score, the number of overs remaining, the relative desire to win versus draw, and the scoring characteristics of the particular match. Decision rules are developed and these are assessed against historical matches. It is found that teams have traditionally been cautious in declaring, and that optimal decision making would lead to more frequent and earlier declarations.

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**JOSE GARRIDO**, Concordia University  
*The Finite-Time Gerber-Shiu Function as a Risk Measure*

We consider a finite-time version of the Gerber-Shiu (G-S) function defined as follows:

$$m_\delta(u; t) = E[e^{-\delta(t \wedge T)} w(U_{(t \wedge T)-}, U_{t \wedge T}) | U_0 = u], \quad u \geq 0, t > 0,$$

for general surplus processes  $U_t$  and bi-variate penalty functions  $w$  (where  $T$  is the time to ruin).

For special choices of the penalty function  $w$  that discriminate between ruin and non-ruin events, we show that  $m_\delta(u; t) = \rho_t(U_t)$  is a risk measure that can be used for hedging positions on the surplus processes  $U_t$ .

Numerical illustrations are given for different insurance surplus.