

McMASTER UNIVERSITY
GRADUATE PROGRAM IN STATISTICS

STATISTICS SEMINAR

Speaker: Reg J. Kulperger
Department of Statistical and Actuarial Sciences
University of Western Ontario

Title: Prediction of Option Prices With GARCH Models
Day: Tuesday, March 18, 2008

Time: 3:30 - 4:30 PM

Place: HH/217 - Deloitte Colloquium Room
(refreshments in HH/216 at 3:00 PM)

SUMMARY

One may model stock prices or returns with either continuous time models or discrete time models. The former are market complete models while the later are not, except for simple models such as the binomial model. This means in the former there is an unique risk neutral measure and in the later there are infinitely many risk neutral measures for pricing contingent claims. In general the choice of such a measure has to be justified by an economic argument.

GARCH models form a class of discrete time series models that are able to capture many statistical properties of returns based on conditional location scale properties. These models are driven by some iid noise process. Usually these are assumed to be Gaussian, but that may not be consistent with the observed data. In this talk we consider some of the modelling and prediction issues. In particular we consider a semiparametric model, in which the driving noise distribution is estimated by a kernel density estimate. Option pricing also depends critically on the choice of risk neutral measure.

This system gives a very good improvement on other available methods of predicting option prices. This is illustrated using one years worth of S&P 500 European call options. The model is fit to S&P returns from the beginning of 1988 till the end of 2003. The so called volatility smile is also well reproduced with these models.

This work is joint work with Alex Badescu, now at the University of Calgary. Further details are in a recent paper that has appeared in *Insurance, Mathematics and Economics* and the thesis by Alex Badescu.

REFERENCES

- A. Badescu and R. J. Kulperger (2008) GARCH Option Pricing: a Semiparametric Approach. To appear in *Insurance, Mathematics and Economics*.

A preprint of this article can be found at

http://www.math.mcmaster.ca/canty/seminars/BadescuKulperger_IME2008.pdf

ABOUT THE SPEAKER



Reg Kulperger received his PhD in 1978 from Carleton University under Donald Dawson. He spent two years as a postdoctoral fellow at Berkeley with Jerzy Neyman and David Brillinger. After 2 years at McMaster he moved to the University of Western Ontario in 1982 where he is now Professor of Statistics.

He has worked in areas of stochastic processes and inference for stochastic processes. Recently the work has focused on some problems in mathematical biology and discrete time finance and GARCH processes. The finance and related areas have included studies empirical processes, choices of risk neutral measures and applications to options and corporate exit modeling. He has directed several PhD students and several MSc students in these topics.

MORE SEMINAR INFORMATION

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