



UNIVERSITY OF SYDNEY

SCHOOL OF MATHEMATICS AND STATISTICS

Statistics Seminar

Friday 20 September, 2.00 p.m.

Lecture Room 173 (Level 1, Carslaw Building)

Stochastic calculus with respect to fractional Brownian motion.

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Abstract

Stochastic differential equations driven by Brownian motion are traditionally used to model the dynamics of stock prices. It is well known that Brownian motion is a typical semimartingale with short range dependence. However, in recent years it has become increasingly obvious that long range dependent phenomenon is widespread in financial data. It is, therefore, of practical and theoretical importance to take into account of long range dependence in the investigation of the behaviour of stock prices.

Most of the talk is concerned with the stochastic calculus with respect to fractional Brownian motion which is not a semimartingale.

I first give an introduction to long range dependence. In particular, I give a brief introduction to fractional Brownian motion which has been proposed as a model for the long range dependence observed in a variety of hydrological and geophysical time series.

Then I present a method of defining stochastic integrals with respect to fractional Brownian motion. The Itô formula is established for fractional Brownian motion. Then I propose and study a fractional Black-Scholes model to describe the movement of stock prices in mathematical finance.

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