STOCHASTIC TIME CHANGES, LÉVY PROCESSES, 
AND ASSET PRICE MODELING

ABSTRACT

Brownian motion has played a central role in financial modelling, from the assumption of Gaussian asset returns in portfolio theory to the use of geometric Brownian motion for stock prices in the Black-Scholes model.

In this talk, I will

(i) exhibit deviations from normality of returns and continuity of price trajectories displayed by stock and equity indices,

(ii) show that stochastic time changes naturally arise in finance in order to represent random news arrival and market activity, and

(iii) propose this “transaction clock” as a mechanism for exhibiting particular classes of pure jump Lévy processes to represent asset returns. Results will be illustrated by an empirical analysis of a database of individual stocks and major U.S. indices.