Mimicking: Martingales with Matching Marginals

Jie Yen Fan

Monash University

Abstract

A stochastic process can be viewed as a collection of random variables and is often used to represent the evolution over time of some random value, or system. Its marginal distributions are its one-dimensional distributions, for example, those at fixed times. Processes are not uniquely defined by their marginal distributions, even with additional properties, such as being a martingale. We will explore such phenomenon. Motivated by questions in finance, we are interested in constructing new processes from existing ones while preserving the marginal distributions and the martingale property. We call this mimicking. This would enable us to develop alternative models for asset prices, with the hope of improving upon the existing ones, while retaining the (European) option prices. We will also look at a few methods of mimicking for certain types of processes.