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Review of Computational Methods in Finance

Jeffrey E. Jarrett

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Published Review from Technometrics by Jeffrey E. Jarrett, PhD

Computational Methods in Finance / Ali Hirsa p. cm. – (Chapman & Hall/CRC Financial Mathematics Series) ISBN 978-1-4398-2957-8, hard cover, \$89.95)

A new contribution to the various texts on mathematical finance is the new volume by Ali Hirsa of Columbia University and the Courant Institute of New York University. Although Finance and Investments professionals rarely have the mathematical background to read and evaluate this volume, the book is meant to be read by mathematicians who have devoted their work and research into reformulating financial pricing problems into a collection of methods to be solved by higher mathematics. Pricing of financial assets in recent years is one great area of mathematical applications to improve the pricing and value estimation of the so-called derivatives and other financial assets which are currently difficult to price and value. The author studies contracts for derivatives and related financial products through the use of simulation, modal calibration and parameter estimation with many practical examples using statistics. Hirsa intends the audience to be mathematics of finance students specializing in financial engineering, statistics, and other researchers who implement models to solve difficult problems not subject to simple expectation techniques. The book is stand-alone since it covers the mathematics necessary for such calculations. Some may disagree with this purpose, but the book is to be read largely in classes at the first or second year graduate levels in mathematics, mathematical finance and mathematical economics.

Chapter 1 of the books reviews basic concepts of relating the construction of the characteristic function of stochastic processes. If one is not familiar with these topics , certainly a course or book stochastic processes would be a wise prerequisite to understand this chapter and the many that follow. The goal of the chapter is to provide a model explaining the stochastic evolution of an assets which will form the basis for all derivative pricing algorithms to be developed later in the manuscript.

Chapters 2 through 6 introduce the many approaches of mathematics for pricing derivatives contracts. These include transformation techniques, simulation by Monte Carlo methods and the finite difference method for solving partial differential equations and partial-integro differential equations. Without going into detail on the subject matter of chapter from 2 to 6, the author shows how to solve problems having the aforementioned characteristics chapter by chapter to enable the reader to have all the knowledge necessary to satisfy the goal of solving derivative pricing by any of the solutions introduced earlier.

Chapter 7 provides guidance in a very practical sense. The purpose is to enable the reader to calibrate the parameter various models for estimation produced earlier in order to obtain model prices compatible with market prices. The essential steps in the calibration process include the objection function and the optimization methodology. These steps are focused on by Hirsra in detail. Model risk is also defined and evaluated.

The last chapter, 8, covers the many filtering methods and their implantation employed in time series analysis to solve the problems associated with finding the optimal parameters for the model and the best estimates for the parameters included.

The volume contains a numerous test cases and examples for those to ponder about after finished the book.

In all, the manuscript is not a quick read and focuses mainly on one very important but very difficult problem of pricing and evaluating financial derivatives and similar products. This area of finance and investments is growing rapidly and is a welcome application of mathematical finance. Simple computations are a thing of the past and Hirsra delivers a monumental addition to mathematical finance in the same category of previous manuscripts reviewed by this reviewer and others in this growing excited new area of applied mathematics. In essence, this manuscript may be the source of many future doctoral dissertations.

Jeffrey E. Jarrett, Ph.D.

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19-Jun-2013

Dear Dr. Jarrett

Thank you for reviewing the revised manuscript TPRS-2012-IJPR-0876.R2 entitled "A Comparison of Weighted CUSUM Procedures for Monitoring Process Proportions with Varying Sample Sizes" for the International Journal of Production Research.

I greatly appreciate the voluntary contribution that each reviewer gives to the Journal. I hope that we may continue to seek your assistance with the refereeing process for IJPR, and hope also to receive your own research papers that are appropriate to our aims and scope.

Sincerely,

Editor-in-Chief, International Journal of Production Research ijpr@tandf.co.uk