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Numerical Methods in Finance and Economics: A MATLAB-Based Introduction

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[Reviewed by Ita Cirovic Donev, on 11/23/2006]

The correct application of numerical methods in finance is essential, as they directly relate to pricing methods, which in turn have a direct impact on the profit and loss distribution of a portfolio. Many of us are aware of numerical inaccuracies due to number representation, rounding or truncation and their effect on the final outcome of the solution to the problem at hand. In the financial industry, small numerical errors can mean tremendous losses for an institution. The current book provides some "baby steps" in the application of numerical methods in finance. I say "baby steps" because, naturally, there is much more to it if you are considering more sophisticated pricing schemes.

The book is divided into four parts with several appendices. Part I is titled *Background*. Generally, it covers financial theory that is to be later used in the book. Readers with a good finance background can easily omit this part, whereas others will find this an easy and transparent introduction to some basic concepts of finance in fixed-income, stock and derivatives market. Part II covers numerical methods. For more efficient reading it would be best if the reader had some background in linear algebra, but it is not a requirement, as the author provides the background theory where needed. Furthermore, one can always read the additional references that are provided at the end of each chapter. The author covers basic numerical analysis, numerical integration, finite difference methods and convex optimization. The presentation is very lucid. MATLAB code is given for almost every calculation, which enables frequent computer interaction. Hence, almost all of the examples presented can be redone by the reader. Part III deals with pricing equity options. Option pricing is given by binomial and trinomial lattices, Monte Carlo methods and by finite difference methods. Part IV covers some advanced optimization models such as dynamic programming, non-convex optimization, and linear stochastic programming methods with recourse.

The book is written in such a lucid way that it provides great pleasure in reading. There is a general feeling that you are just flying through the book and that you own the concepts presented. Naturally, there could always be more explanation, but since the book already has almost 700 pages, making it bigger might just turn away the (student) audience. After all, the intended audience are readers with not much experience in numerical methods; for such readers, the explanations and presentations are perfectly aligned. This book is excellent for students primarily so that they can get acquainted with pricing methods before embarking on professional careers, where this knowledge would then be improved. It can also be of great value to practitioners who are new to the field.

Ita Cirovic Donev is a PhD candidate at the University of Zagreb. She holds a Masters degree in statistics from Rice University. Her main research areas are in mathematical finance; more precisely, statistical methods of credit and market risk. Apart from the academic work she does consulting work for financial institutions.

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