Pricing Financial Instruments: The Finite Difference Method (Wiley Series in Financial Engineering)

Domingo Tavella, Curt Randall
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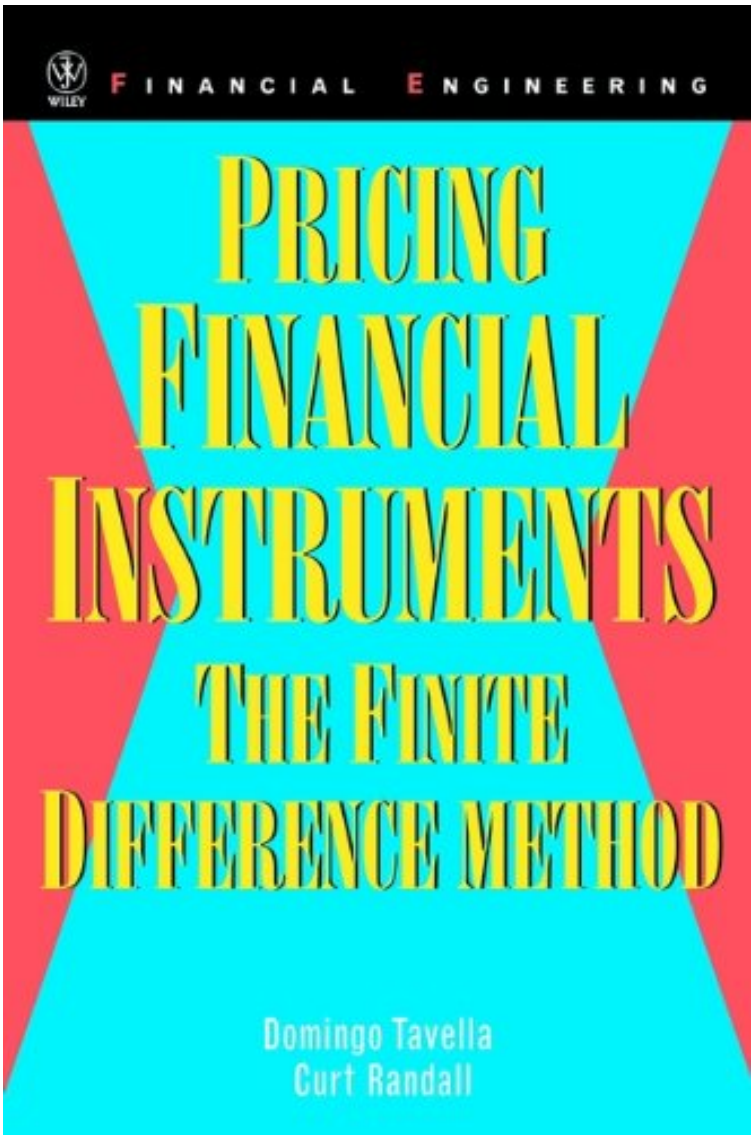

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Domingo Tavella, Curt Randall : Pricing Financial Instruments: The Finite Difference Method (Wiley Series in Financial Engineering) before purchasing it in order to gage whether or not it would be worth my time, and all praised Pricing Financial Instruments: The Finite Difference Method (Wiley Series in Financial Engineering):

1 of 1 people found the following review helpful. Financial Engineering ReviewBy Roberto B. KerrIt is a very good book, well written and didactic. It covers important topics related to Financial Engineering, such as Stochastic

Processes, the Pricing Equations, it also covers numerical methods such as the Finite Difference Methods. There is a topic covering the linear complementarity formulation of American Option Pricing which was able to make me understand it much better than ever before.12 of 12 people found the following review helpful. A specialised book for special InstrumentsBy A CustomerThis book approximates the solution of one-factor and multi-factor PDEs that describe derivatives such as barrier options, convertible bonds, Asian options and credit derivatives.Standard finite difference schemes are used. In particular, 3-point centred difference schemes approximate the derivatives in the S directions while Crank-Nicolson (averaging) is used to approximate the t derivative. Stability and convergence of the schemes are proved using the Lax Equivalence theoerem. Special attention is paid to resolving the, by now well known problems associated with the Crank Nicolson method. The workarounds are choosing smaller meshes near discontinuous boundaries, coordinate transformations and choosing the right sampling points.The book is a good attempt (in my opinion) to show how to apply FDM in financial engineering applications. It is probably most useful for those who have already experience of FDM. It is NOT an introductory book.Some of the criticisms are (this is why I give it a 3 star):1. The von Neumann stability analyis technique is only applicable to constant coefficient, linear PDE. It is outdated, better methods being the maximum principle and viscosity solutions.2. The discrete set of equations need to be solved by rather esoteric matrix solvers bacause the authors discretise a PDE in all directions. Using ADI or operator splitting instead lets us solve one-dimensional problem with Tridiagonal LU Decomposition.3. A lot of detail on meshes has unfortunately been left out.4. Using Crank Nicolson only aggrevates the problems in FDM schemes. There ARE better methods out there.5. TYPOS!! for example, equation (4.13) on page 122. The S term is missing.On the other hand, this book is aimed at real-life problems. However, extra detail needs to be added in my opinion in order to make it more accessible to a wider audience.19 of 19 people found the following review helpful. A clear treatment, with well-chosen subjectsBy Brian BoonstraTavella and Randall have produced a compact, yet complete treatment of finite difference techniques in finance. I met Curt Randall in 1996 when his SciFinance software was in its infancy (though there is currently no connection between us). This software automatically generates C code to solve PDE's. That is an order of magnitude -- maybe two orders -- harder than just writing the code by hand. I inferred that Dr. Randall has a unique understanding of finite-difference methods for solving PDE's. For these reasons, I was very interested to see his book. For a more general treatment finite difference schemes, see Gordon Smith's 1986 book.The mathematical motivations for all the techniques presented are given, with no wasted exposition. I liked the lucid analyses of stability, which many books in finance gloss over. I also liked the mention and partial analysis of a large set of solvers of sparse linear systems. having not followed the literature on jump processes in recent years, I was quite happy to see their treatment as well.This book is all of what it claims to be, and no more. I do not recommend it as a textbook, or as a reference for those not already somewhat familiar with the subject, either from the mathematics side or the finance side. You will not get an explanation of what an eigenvalue or fourier transform is. The Lax Equivalence Theorem is cited, but not motivated or proven. No mention is given of when it might make more sense to use, say, a Monte Carlo scheme to find an option price. You won't find much economics in the book. But you will find a clear, correct, and useful analysis of more or less all aspects of finite difference schemes as they relate to solving contingent claims pricing problems.

Numerical methods for the solution of financial instrument pricing equations are fast becoming essential for practitioners of modern quantitative finance. Among the most promising of these new computational finance techniques is the finite difference method-yet, to date, no single resource has presented a quality, comprehensive overview of this revolutionary quantitative approach to risk management. Pricing Financial Instruments, researched and written by Domingo Tavella and Curt Randall, two of the chief proponents of the finite difference method, presents a logical framework for applying the method of finite difference to the pricing of financial derivatives. Detailing the algorithmic and numerical procedures that are the foundation of both modern mathematical finance and the creation of financial products-while purposely keeping mathematical complexity to a minimum-this long-awaited book demonstrates how the techniques described can be used to accurately price simple and complex derivative structures. From a summary of stochastic pricing processes and arbitrage pricing arguments, through the analysis of numerical schemes and the implications of discretization-and ending with case studies that are simple yet detailed enough to demonstrate the capabilities of the methodology- Pricing Financial Instruments explores areas that include: * Pricing equations and the relationship be-tween European and American derivatives * Detailed analyses of different stability analysis approaches * Continuous and discrete sampling models for path dependent options * One-dimensional and multi-dimensional coordinate transformations * Numerical examples of barrier options, Asian options, forward swaps, and more With an emphasis on how numerical solutions work and how the approximations involved affect the accuracy of the solutions, Pricing Financial Instruments takes us through doors opened wide by Black, Scholes, and Merton-and the arbitrage pricing principles they introduced in the early 1970s-to provide a step-by-step outline for sensibly interpreting the output of standard numerical schemes. It covers the understanding and application of today's finite difference method, and takes the reader to the next level of pricing financial instruments and managing financial risk. Praise for Pricing Financial Instruments "Pricing Financial Instruments is the first broad

and accessible treatment of finite difference methods for pricing derivative securities. The authors have taken great care to clearly explain both the origins of the pricing problems in a financial setting, as well as many practical aspects of their numerical methods. The book covers a wide variety of applications, such as American options and credit derivatives. Both financial analysts and academic asset-pricing specialists will want to own a copy."-Darrell Duffie, Professor of Finance Stanford University "In my experience, finite difference methods have proven to be a simple yet powerful tool for numerically solving the evolutionary PDEs that arise in modern mathematical finance. This book should finally dispel the widely held notion that these methods are somehow difficult or abstract. I highly recommend it to anyone interested in the implementation of these methods in the financial arena."-Peter Carr, Principal Bank of America Securities "A very comprehensive treatment of the application of finite difference techniques to derivatives finance. Practitioners will find the many extensive examples very valuable and students will appreciate the rigorous attention paid to the many subtleties of finite difference techniques."-Francis Longstaff, Professor The Anderson School at UCLA "The finite difference approach is central to the numerical pricing of financial securities. This book gi

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pricing specialists will want to own a copy."-Darrell Duffie, Professor of Finance Stanford University "In my experience, finite difference methods have proven to be a simple yet powerful tool for numerically solving the evolutionary PDEs that arise in modern mathematical finance. This book should finally dispel the widely held notion that these methods are somehow difficult or abstract. I highly recommend it to anyone interested in the implementation of these methods in the financial arena."-Peter Carr, Principal Bank of America Securities "A very comprehensive treatment of the application of finite difference techniques to derivatives finance. Practitioners will find the many extensive examples very valuable and students will appreciate the rigorous attention paid to the many subtleties of finite difference techniques."-Francis Longstaff, Professor The Anderson School at UCLA "The finite difference approach is central to the numerical pricing of financial securities. This book gives a clear and succinct introduction to this important subject. Highly recommended."-Mark Broadie, Associate Professor School of Business, Columbia University For updates on new and bestselling Wiley Finance books: wiley.com/wbnsAbout the AuthorDOMINGO TAVELLA, Ph.D., is President of Octanti Associates, a consulting firm in risk management and financial systems design. He is the founder and chief editor of the Journal of Computational Finance, and has pioneered the application of advanced numerical techniques in pricing and risk analysis in the financial and insurance industries. Before founding Octanti Associates, Dr. Tavella was director of financial engineering at Integral Development Corporation and vice president at Bankers Trust Securities. Prior to that, he was a scientist at Stanford University and NASA Ames Research Center. CURT RANDALL, Ph.D.,is a Principal and Vice President of Applications at SciComp Inc., a leading developer of software synthesis technology for the finance industry. He has extensive experience in the application of finite difference methods to a variety of disciplines. Prior to joining SciComp, Dr. Randall developed computational methods for advanced simulations at Schlumberger Corporation. Before that, he was a research scientist at Lawrence Livermore National Laboratory.