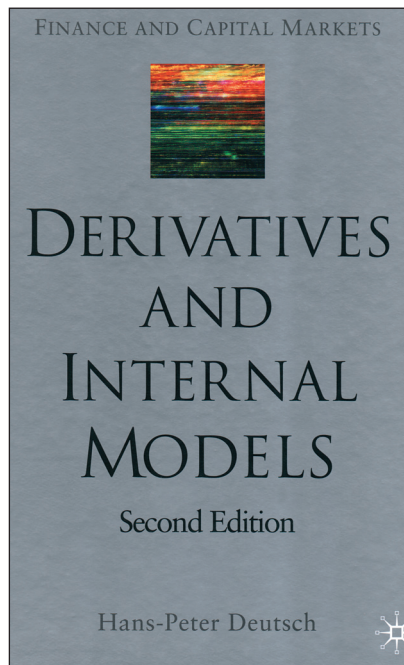


## Books

# A model companion



### Derivatives and Internal Models

by Hans-Peter Deutsch

Palgrave

621 pages, \$120

ISBN 0-333-97706-8

Hans-Peter Deutsch's book is a wide-ranging and detailed introduction to the theory and techniques of derivatives modelling and market risk management. The presentation is well structured, building up each topic from intuition or motivation through a mathematical formulation in a precise and consistent notation. The CD-Rom that comes with it contains many spreadsheet examples demonstrating the techniques outlined.

Previous derivatives or finance knowledge is not a prerequisite for this book. All the required background is here, beginning with the basics of interest rates, market conventions, present value and compounding, and building from there. But there is an assumption that the reader possesses a scientific, quantitative or mathematical background, as mathematical notation is abundant.

The author's extensive background in financial and commodity risk consulting is clearly demonstrated by the selection and presentation of topics, which is somewhat clinical. Reference to cases where the assumptions of the models may not

reflect realities are numerous. However, for these cases, discussion of repercussions or alternatives are not offered. I would warn readers to utilise this book as a valuable resource on the science and mechanics, but to investigate other more empirical approaches as well.

The book is organised into five parts. The fundamentals are covered in part 1, starting with the legal environment and various regulatory requirements relating to derivatives and risk management, then developing a model for financial risk factors, random walks, diffusion processes and Itô's lemma and concluding with an overview of basic financial instruments. The largest section, part 2, covers derivatives pricing methods and techniques. This section begins with the concepts of present value, internal rate of return and the traditional sensitivities of interest rate instruments, before introducing arbitrage pricing theory and the Black-Scholes differential equation. Finite difference, binomial and trinomial trees and Monte Carlo simulations are each presented in great detail, as are the concepts of martingale and numeraire and interest rate term-structure models.

Part 3 concentrates on market instruments, starting with spot transactions on interest rates such as zero bonds, coupon bonds and swaps, continuing with forward transactions such as forward rate agreements and forward swaps. Next, plain vanilla options on various underlyings are

he intuitively presents risk factors as random walks. I found his method of beginning with the derivation of the model itself (ie, looking at a plot of closing prices for a stock over 500 days, and asking a series of questions regarding the process to be modelled) to offer an illuminating prelude to the theoretical discussion on Itô processes and stochastic analysis that follows.

Numerical solutions using finite differences is another topic that the author covers with an exceptional level of detail and clarity. The introductory material on discretising the Black-Scholes equation and the descriptions of explicit, implicit and combination methods provides a clear and intuitive understanding of the techniques. From the basics, the author then goes into more advanced topics such as uniform versus non-uniform grids, Dirichlet and Neumann boundary conditions, and free boundary conditions to extend the technique to American-style options. The discussion concludes with a comparison of the methods ranking them by numerical effort, convergence and stability, and a discussion on convergence criteria and techniques to improve convergence. The included spreadsheet example incorporates all the concepts from the section and can be used as a valuable learning tool or the basis for further development.

I would highly recommend this book as both a valuable reference for derivatives market professionals and as a self-

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discussed, before concluding with a somewhat limited discussion on various exotic option types and structured products.

Market risk management is discussed in part 4, which covers variance-covariance, simulation and stress testing, value-at-risk and back-testing of models. Market data topics including time-series modelling, Garch forecasting and principal component analyses are covered in part 5, followed by an appendix covering probability and statistics topics.

Early in the book, the author develops a model for financial risk factors in which

contained course of study for derivatives newcomers. Deutsch has compiled a comprehensive and well-written introduction to the methods and techniques underlying modern derivatives pricing and risk management. All the relevant topics are covered in both an intuitive and mathematically precise manner and with ample detail. Whether you are looking for a standard reference or a stand-alone self-learning guide, *Derivatives and Internal Models* deserves a place on your bookshelf. ■

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