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ANALYTICAL FINANCE: VOLUME II

THE MATHEMATICS OF INTEREST RATE DERIVATIVES, MARKETS, RISK AND VALUATION

Springer Analytical Finance is a comprehensive introduction to the financial engineering of equity and interest rate instruments for financial markets. Developed from notes from the author's many years in quantitative risk management and modeling roles, and then for the Financial Engineering course at Mälardalen University, it provides exhaustive coverage of vanilla and exotic mathematical finance applications for trading and risk management, combining rigorous theory with real market application. Coverage includes: • Date arithmetic's, quote types of interest rate instruments • The interbank market and reference rates, including negative rates• Valuation and modeling of IR instruments; bonds, FRN, FRA, forwards, futures, swaps, CDS, caps/floors and others • Bootstrapping and how to create interest rate curves from prices of traded instruments• Risk measures of IR instruments• Option Adjusted Spread and embedded options• The term structure equation, martingale measures and stochastic processes of interest rates; Vasicek, Ho-Lee, Hull-While, CIR• Numerical models; Black-Derman-Toy and forward induction using Arrow-Debreu prices and Newton–Raphson in 2 dimension• The Heath-Jarrow-Morton framework• Forward measures and general option pricing models• Black log-normal and, normal model for derivatives, market models and managing exotics instruments• Pricing before and after the financial crisis, collateral discounting, multiple curve framework, cheapest-to-deliver curves, CVA, DVA and FVA

ANALYTICAL FINANCE: VOLUME I

THE MATHEMATICS OF EQUITY DERIVATIVES, MARKETS, RISK AND VALUATION

Springer This book provides an introduction to the valuation of financial instruments on equity markets. Written from the perspective of trading, risk management and quantitative research functions and written by a practitioner with many years' experience in markets and in academia, it provides a valuable learning tool for students and new entrants to these markets. Coverage includes: ·Trading and sources of risk, including credit and counterparty risk, market and model risks, settlement and Herstatt risks. ·Numerical methods including discrete-time methods, finite different methods, binomial models and Monte Carlo simulations. ·Probability theory and stochastic processes from the financial modeling perspective, including probability spaces, sigma algebras, measures and filtrations. ·Continuous time models such as Black-Scholes-Merton; Delta-hedging and Delta-Gamma-hedging; general diffusion models and how to solve Partial Differential Equation using the Feynmann-Kac representation. ·The trading, structuring and hedging several kinds of exotic options, including: Binary/Digital options; Barrier options; Lookbacks; Asian options; Chooses; Forward options; Ratchets; Compounded options; Basket options; Exchange and Currency-linked options; Pay later options and Quantos. ·A detailed explanation of how to construct synthetic instruments and strategies for different market conditions, discussing more than 30 different option strategies. With source code for many of the models featured in the book provided and extensive examples and illustrations throughout, this book provides a comprehensive introduction to this topic and will prove an invaluable learning tool and reference for anyone studying or working in this field.

MARKET RISK ANALYSIS, QUANTITATIVE METHODS IN FINANCE

Wiley Written by leading market risk academic, Professor Carol Alexander, Quantitative Methods in Finance forms part one of the Market Risk Analysis four volume set. Starting from the basics, this book helps readers to take the first step towards becoming a properly qualified financial risk manager and asset manager, roles that are currently in huge demand. Accessible to intelligent readers with a moderate understanding of mathematics at high school level or to anyone with a university degree in mathematics, physics or engineering, no prior knowledge of finance is necessary. Instead the emphasis is on understanding ideas rather than on mathematical rigour, meaning that this book offers a fast-track introduction to financial analysis for readers with some quantitative background, highlighting those areas of mathematics that are particularly relevant to solving problems in financial risk management and asset management. Unique to this book is a focus on both continuous and discrete time finance so that Quantitative Methods in Finance is not only about the application of mathematics to finance; it also explains, in very pedagogical terms, how the continuous time and discrete time finance disciplines meet, providing a comprehensive, highly accessible guide which will provide readers with the tools to start applying their knowledge immediately. All together, the Market Risk Analysis four volume set illustrates virtually every concept or formula with a practical, numerical example or a longer, empirical case study. Across all four volumes there are approximately 300 numerical and empirical examples, 400 graphs and figures and 30 case studies many of which are contained in interactive Excel spreadsheets available from the accompanying CD-ROM . Empirical examples and case studies specific to this volume include: Principal component analysis of European equity indices; Calibration of Student t distribution by maximum likelihood; Orthogonal regression and estimation of equity factor models; Simulations of geometric Brownian motion, and of correlated Student t variables; Pricing European and American options with binomial trees, and European options with the Black-Scholes-Merton formula; Cubic spline fitting of yields curves and implied volatilities; Solution of Markowitz problem with no short sales and other constraints; Calculation of risk adjusted performance metrics including generalised Sharpe ratio, omega and kappa indices.

MARKET RISK ANALYSIS, VALUE AT RISK MODELS

John Wiley & Sons Written by leading market risk academic, Professor Carol Alexander, Value-at-Risk Models forms part four of the Market Risk Analysis four volume set. Building on the three previous volumes this book provides by far the most comprehensive, rigorous and detailed treatment of market VaR models. It rests on the basic knowledge of financial mathematics and statistics gained from Volume I, of factor models, principal component analysis, statistical models of volatility and correlation and copulas from Volume II and, from Volume III, knowledge of pricing and hedging financial instruments and of mapping portfolios of similar instruments to risk factors. A unifying characteristic of the series is the pedagogical approach to practical examples that are relevant to market risk analysis in practice. All together, the Market Risk Analysis four volume set illustrates virtually every concept or formula with a practical, numerical example or a longer, empirical case study. Across all four volumes there are approximately 300 numerical and empirical examples, 400 graphs and figures and 30 case studies many of which are contained in interactive Excel spreadsheets available from the the accompanying CD-ROM . Empirical examples and case studies specific to this volume include: Parametric linear value at risk (VaR)models: normal, Student t and normal mixture and their expected tail loss (ETL); New formulae for VaR based on autocorrelated returns; Historical simulation VaR models: how to scale historical VaR and volatility adjusted historical VaR; Monte Carlo simulation VaR models based on multivariate normal and Student t distributions, and based on copulas; Examples and case studies of numerous applications to interest rate sensitive, equity, commodity and international portfolios; Decomposition of systematic VaR of large portfolios into standard alone and marginal VaR components; Backtesting and the assessment of risk model risk; Hypothetical factor push and historical stress tests, and stress testing based on VaR and ETL.

MATHEMATICS OF THE FINANCIAL MARKETS

FINANCIAL INSTRUMENTS AND DERIVATIVES MODELLING, VALUATION AND RISK ISSUES

John Wiley & Sons Mathematics of the Financial Markets Financial Instruments and Derivatives Modeling, Valuation and Risk Issues "Alain Ruttiens has the ability to turn extremely complex concepts and theories into very easy to understand notions. I wish I had read his book when I started my career!" Marco Dion, Global Head of Equity Quant Strategy, J.P. Morgan "The financial industry is built on a vast collection of financial securities that can be valued and risk profiled using a set of miscellaneous mathematical models. The comprehension of these models is fundamental to the modern portfolio and risk manager in order to achieve a deep understanding of the capabilities and limitations of these methods in the approximation of the market. In his book, Alain Ruttiens exposes these models for a wide range of financial instruments by using a detailed and user friendly approach backed up with real-life data examples. The result is an excellent entry-level and reference book that will help any student and current practitioner up their mathematical modeling skills in the increasingly demanding domain of asset and risk management." Virgile Rostand, Consultant, Toronto ON "Alain Ruttiens not only presents the reader with a synthesis between mathematics and practical market dealing, but, more importantly a synthesis of his thinking and of his life." René Chopard, CEO, Centro di Studi Bancari Lugano, Vezia / Professor, Università dell'Insubria, Varese "Alain Ruttiens has written a book on quantitative finance that covers a wide range of financial instruments, examples and models. Starting from first principles, the book should be accessible to anyone who is comfortable with trading strategies, numbers and formulas." Dr Yuh-Dauh Lyuu, Professor of Finance & Professor of Computer Science & Information Engineering, National Taiwan University

BUBBLES AND CONTAGION IN FINANCIAL MARKETS, VOLUME 2

MODELS AND MATHEMATICS

Springer This book focuses on extending the models and theories (from a mathematical/statistical point of view) which were introduced in the first volume to a more technical level.

Where volume I provided an introduction to the mathematics of bubbles and contagion, volume II digs far more deeply and widely into the modeling aspects.

HANDBOOK OF QUANTITATIVE FINANCE AND RISK MANAGEMENT

Springer Science & Business Media Quantitative finance is a combination of economics, accounting, statistics, econometrics, mathematics, stochastic process, and computer science and technology. Increasingly, the tools of financial analysis are being applied to assess, monitor, and mitigate risk, especially in the context of globalization, market volatility, and economic crisis. This two-volume handbook, comprised of over 100 chapters, is the most comprehensive resource in the field to date, integrating the most current theory, methodology, policy, and practical applications. Showcasing contributions from an international array of experts, the Handbook of Quantitative Finance and Risk Management is unparalleled in the breadth and depth of its coverage. Volume 1 presents an overview of quantitative finance and risk management research, covering the essential theories, policies, and empirical methodologies used in the field. Chapters provide in-depth discussion of portfolio theory and investment analysis. Volume 2 covers options and option pricing theory and risk management. Volume 3 presents a wide variety of models and analytical tools. Throughout, the handbook offers illustrative case examples, worked equations, and extensive references; additional features include chapter abstracts, keywords, and author and subject indices. From "arbitrage" to "yield spreads," the Handbook of Quantitative Finance and Risk Management will serve as an essential resource for academics, educators, students, policymakers, and practitioners.

MARKET RISK ANALYSIS

Wiley Market Risk Analysis is the most comprehensive, rigorous and detailed resource available on market risk analysis. Written as a series of four interlinked volumes each title is self-contained, although numerous cross-references to other volumes enable readers to obtain further background knowledge and information about financial applications. Volume I: Quantitative Methods in Finance covers the essential mathematical and financial background for subsequent volumes. Although many readers will already be familiar with this material, few competing texts contain such a complete and pedagogical exposition of all the basic quantitative concepts required for market risk analysis. There are six comprehensive chapters covering all the calculus, linear algebra, probability and statistics, numerical methods and portfolio mathematics that are necessary for market risk analysis. This is an ideal background text for a Masters course in finance. Volume II: Practical Financial Econometrics provides a detailed understanding of financial econometrics, with applications to asset pricing and fund management as well as to market risk analysis. It covers equity factor models, including a detailed analysis of the Barra model and tracking error, principal component analysis, volatility and correlation, GARCH, cointegration, copulas, Markov switching, quantile regression, discrete choice models, non-linear regression, forecasting and model evaluation. Volume III: Pricing, Hedging and Trading Financial Instruments has five very long chapters on the pricing, hedging and trading of bonds and swaps, futures and forwards, options and volatility as well detailed descriptions of mapping portfolios of these financial instruments to their risk factors. There are numerous examples, all coded in interactive Excel spreadsheets, including many pricing formulae for exotic options but excluding the calibration of stochastic volatility models, for which Matlab code is provided. The chapters on options and volatility together constitute 50% of the book, the slightly longer chapter on volatility concentrating on the dynamic properties the two volatility surfaces the implied and the local volatility surfaces that accompany an option pricing model, with particular reference to hedging. Volume IV: Value at Risk Models builds on the three previous volumes to provide by far the most comprehensive and detailed treatment of market VaR models that is currently available in any textbook. The exposition starts at an elementary level but, as in all the other volumes, the pedagogical approach accompanied by numerous interactive Excel spreadsheets allows readers to experience the application of parametric linear, historical simulation and Monte Carlo VaR models to increasingly complex portfolios. Starting with simple positions, after a few chapters we apply value-at-risk models to interest rate sensitive portfolios, large international securities portfolios, commodity futures, path dependent options and much else. This rigorous treatment includes many new results and applications to regulatory and economic capital allocation, measurement of VaR model risk and stress testing.

PROBLEMS AND SOLUTIONS IN MATHEMATICAL FINANCE

COMMODITY AND FOREIGN EXCHANGE DERIVATIVES

Wiley A practical problem solving reference for commodity and Forex derivatives Problems and Solutions in Mathematical Finance provides an innovative reference for quantitative finance students and practitioners. Using a unique problem-solving approach, this invaluable guide bridges the gap between the theoretical and practical to impart a deeper understanding of the mathematical problems encountered in the finance industry. Volume IV: Commodity and Foreign Exchange Derivatives breaks down the complexity of the topic by walking you step-by-step through a variety of modelling problems. Building skill upon skill, you'll work through a series of problems of increasing difficulty as you learn both the strategy and mechanics behind each solution. Coverage includes both theoretical and real-world problems, using stochastic calculus, probability theory and statistics, as well as an assumed understanding of exotic option and interest rate models covered in volumes II and III. Financial institutions rely on quantitative analysis to inform decision making on trading, hedging, investing, risk management and pricing. This book provides both instruction and reference from a highly practical perspective, giving you a highly applicable real-world skillset. Fully grasp the fundamentals of commodity and foreign exchange derivatives Follow mathematical modelling processes step-by-step Link theory to real-world problems through guided problem-solving Test your knowledge and skills with increasingly complex problem sets Commodity and Foreign Exchange Derivatives are a complex, nuanced area in the quantitative finance realm. Simply reading about these instruments fails to convey the level of understanding required to work with them; in the real-world, quants draw upon an in-depth knowledge of both finance and mathematics every day. Problems and Solutions in Mathematical Finance provides practical reference and problem-solving skills for anyone learning or working in quantitative finance.

RISK ANALYSIS IN FINANCE AND INSURANCE

CRC Press Historically, financial and insurance risks were separate subjects most often analyzed using qualitative methods. The development of quantitative methods based on stochastic analysis is an important achievement of modern financial mathematics, one that can naturally be extended and applied in actuarial mathematics. Risk Analysis in Finance and Insurance offers the first comprehensive and accessible introduction to the ideas, methods, and probabilistic models that have transformed risk management into a quantitative science and led to unified methods for analyzing insurance and finance risks. The author's approach is based on a methodology for estimating the present value of future payments given current financial, insurance, and other information, which leads to proper, practical definitions of the price of a financial contract, the premium for an insurance policy, and the reserve of an insurance company. Self-contained and full of exercises and worked examples, Risk Analysis in Finance and Insurance serves equally well as a text for courses in financial and actuarial mathematics and as a valuable reference for financial analysts and actuaries. Ancillary electronic materials will be available for download from the publisher's Web site.

MATHEMATICS FOR FINANCE

AN INTRODUCTION TO FINANCIAL ENGINEERING

Springer This textbook contains the fundamentals for an undergraduate course in mathematical finance aimed primarily at students of mathematics. Assuming only a basic knowledge of probability and calculus, the material is presented in a mathematically rigorous and complete way. The book covers the time value of money, including the time structure of interest rates, bonds and stock valuation; derivative securities (futures, options), modelling in discrete time, pricing and hedging, and many other core topics. With numerous examples, problems and exercises, this book is ideally suited for independent study.

INTRODUCTION TO THE ECONOMICS AND MATHEMATICS OF FINANCIAL MARKETS

MIT Press An innovative textbook for use in advanced undergraduate and graduate courses; accessible to students in financial mathematics, financial engineering and economics. Introduction to the Economics and Mathematics of Financial Markets fills the longstanding need for an accessible yet serious textbook treatment of financial economics. The book provides a rigorous overview of the subject, while its flexible presentation makes it suitable for use with different levels of undergraduate and graduate students. Each chapter presents mathematical models of financial problems at three different degrees of sophistication: single-period, multi-period, and continuous-time. The single-period and multi-period models require only basic calculus and an introductory probability/statistics course, while an advanced undergraduate course in probability is helpful in understanding the continuous-time models. In this way, the material is given complete coverage at different levels; the less advanced student can stop before the more sophisticated mathematics and still be able to grasp the general principles of financial economics. The book is divided into three parts. The first part provides an introduction to basic securities and financial market organization, the concept of interest rates, the main mathematical models, and quantitative ways to measure risks and rewards. The second part treats option pricing and hedging; here and throughout the book, the authors emphasize the Martingale or probabilistic approach. Finally, the third part examines equilibrium models—a subject often neglected by other texts in financial mathematics, but included here because of the qualitative insight it offers into the behavior of market participants and pricing.

MATHEMATICS FOR FINANCIAL ANALYSIS

Elsevier Mathematics for Financial Analysis focuses on the application of mathematics in financial analysis, including applications of differentiation, logarithmic functions, and compounding. The publication first ponders on equations and graphs, vectors and matrices, and linear programming. Discussions focus on duality and minimization problems, systems of linear inequalities, linear programs, matrix inversion, properties of matrices and vectors, vector products, equations and graphs, higher dimensional spaces, distance in the plane, coordinate geometry, and inequalities and absolute value. The text then examines differential calculus, applications of differentiation, and antidifferentiation and definite integration. Topics include fundamental theorem of calculus, definite integral, profit optimization in a monopoly, revenue from taxation, curve sketching, concavity and points of inflection, and rules for differentiation. The book examines the applications of integration and differentiation and integration of exponential and logarithmic functions, including exponential and logarithmic functions, differentiation and integration of logarithmic functions, and continuous compounding. The publication is a valuable source of data for researchers interested in the application of mathematics in financial analysis.

ENCYCLOPEDIA OF FINANCIAL MODELS

John Wiley & Sons Volume 2 of the Encyclopedia of Financial Models The need for serious coverage of financial modeling has never been greater, especially with the size, diversity,

and efficiency of modern capital markets. With this in mind, the Encyclopedia of Financial Models has been created to help a broad spectrum of individuals—ranging from finance professionals to academics and students—understand financial modeling and make use of the various models currently available. Incorporating timely research and in-depth analysis, Volume 2 of the Encyclopedia of Financial Models covers both established and cutting-edge models and discusses their real-world applications. Edited by Frank Fabozzi, this volume includes contributions from global financial experts as well as academics with extensive consulting experience in this field. Organized alphabetically by category, this reliable resource consists of forty-four informative entries and provides readers with a balanced understanding of today's dynamic world of financial modeling. Volume 2 explores Equity Models and Valuation, Factor Models for Portfolio Construction, Financial Econometrics, Financial Modeling Principles, Financial Statements Analysis, Finite Mathematics for Financial Modeling, and Model Risk and Selection Emphasizes both technical and implementation issues, providing researchers, educators, students, and practitioners with the necessary background to deal with issues related to financial modeling The 3-Volume Set contains coverage of the fundamentals and advances in financial modeling and provides the mathematical and statistical techniques needed to develop and test financial models Financial models have become increasingly commonplace, as well as complex. They are essential in a wide range of financial endeavors, and the Encyclopedia of Financial Models will help put them in perspective.

ANALYSIS, GEOMETRY, AND MODELING IN FINANCE

ADVANCED METHODS IN OPTION PRICING

CRC Press Analysis, Geometry, and Modeling in Finance: Advanced Methods in Option Pricing is the first book that applies advanced analytical and geometrical methods used in physics and mathematics to the financial field. It even obtains new results when only approximate and partial solutions were previously available. Through the problem of option pricing, the author introduces powerful tools and methods, including differential geometry, spectral decomposition, and supersymmetry, and applies these methods to practical problems in finance. He mainly focuses on the calibration and dynamics of implied volatility, which is commonly called smile. The book covers the Black–Scholes, local volatility, and stochastic volatility models, along with the Kolmogorov, Schrödinger, and Bellman–Hamilton–Jacobi equations. Providing both theoretical and numerical results throughout, this book offers new ways of solving financial problems using techniques found in physics and mathematics.

FINANCIAL MATHEMATICS

THEORY AND PROBLEMS FOR MULTI-PERIOD MODELS

Springer Science & Business Media With the Bologna Accords a bachelor-master-doctor curriculum has been introduced in various countries with the intention that students may enter the job market already at the bachelor level. Since financial Institutions provide non negligible job opportunities also for mathematicians, and scientists in general, it appeared to be appropriate to have a financial mathematics course already at the bachelor level in mathematics. Most mathematical techniques in use in financial mathematics are related to continuous time models and require thus notions from stochastic analysis that bachelor students do in general not possess. Basic notions and methodologies in use in financial mathematics can however be transmitted to students also without the technicalities from stochastic analysis by using discrete time (multi-period) models for which general notions from Probability suffice and these are generally familiar to students not only from science courses, but also from economics with quantitative curricula. There do not exists many textbooks for multi-period models and the present volume is intended to fill in this gap. It deals with the basic topics in financial mathematics and, for each topic, there is a theoretical section and a problem section. The latter includes a great variety of possible problems with complete solution.

COMPUTATIONAL INTELLIGENCE IN ECONOMICS AND FINANCE

Springer Readers will find, in this highly relevant and groundbreaking book, research ranging from applications in financial markets and business administration to various economics problems. Not only are empirical studies utilizing various CI algorithms presented, but so also are theoretical models based on computational methods. In addition to direct applications of computational intelligence, readers can also observe how these methods are combined with conventional analytical methods such as statistical and econometric models to yield preferred results.

FINANCIAL MATHEMATICS, DERIVATIVES AND STRUCTURED PRODUCTS

Springer This book introduces readers to the financial markets, derivatives, structured products and how the products are modelled and implemented by practitioners. In addition, it equips readers with the necessary knowledge of financial markets needed in order to work as product structurers, traders, sales or risk managers. As the book seeks to unify the derivatives modelling and the financial engineering practice in the market, it will be of interest to financial practitioners and academic researchers alike. Further, it takes a different route from the existing financial mathematics books, and will appeal to students and practitioners with or without a scientific background. The book can also be used as a textbook for the following courses: • Financial Mathematics (undergraduate level) • Stochastic Modelling in Finance (postgraduate level) • Financial Markets and Derivatives (undergraduate level) • Structured Products and Solutions (undergraduate/postgraduate level)

THE MATHEMATICS OF DERIVATIVES

TOOLS FOR DESIGNING NUMERICAL ALGORITHMS

John Wiley & Sons Praise for The Mathematics of Derivatives "The Mathematics of Derivatives provides a concise pedagogical discussion of both fundamental and very recent developments in mathematical finance, and is particularly well suited for readers with a science or engineering background. It is written from the point of view of a physicist focused on providing an understanding of the methodology and the assumptions behind derivative pricing. Navin has a unique and elegant viewpoint, and will help mathematically sophisticated readers rapidly get up to speed in the latest Wall Street financial innovations." —David Montano, Managing Director JPMorgan Securities A stylish and practical introduction to the key concepts in financial mathematics, this book tackles key fundamentals in the subject in an intuitive and refreshing manner whilst also providing detailed analytical and numerical schema for solving interesting derivatives pricing problems. If Richard Feynman wrote an introduction to financial mathematics, it might look similar. The problem and solution sets are first rate." —Barry Ryan, Partner Bhramavira Capital Partners, London "This is a great book for anyone beginning (or contemplating), a career in financial research or analytic programming. Navin dissects a huge, complex topic into a series of discrete, concise, accessible lectures that combine the required mathematical theory with relevant applications to real-world markets. I wish this book was around when I started in finance. It would have saved me a lot of time and aggravation." —Larry Magargal

FINANCIAL ECONOMETRICS, MATHEMATICS AND STATISTICS

THEORY, METHOD AND APPLICATION

Springer This rigorous textbook introduces graduate students to the principles of econometrics and statistics with a focus on methods and applications in financial research. Financial Econometrics, Mathematics, and Statistics introduces tools and methods important for both finance and accounting that assist with asset pricing, corporate finance, options and futures, and conducting financial accounting research. Divided into four parts, the text begins with topics related to regression and financial econometrics. Subsequent sections describe time-series analyses; the role of binomial, multi-nomial, and log normal distributions in option pricing models; and the application of statistics analyses to risk management. The real-world applications and problems offer students a unique insight into such topics as heteroskedasticity, regression, simultaneous equation models, panel data analysis, time series analysis, and generalized method of moments. Written by leading academics in the quantitative finance field, allows readers to implement the principles behind financial econometrics and statistics through real-world applications and problem sets. This textbook will appeal to a less-served market of upper-undergraduate and graduate students in finance, economics, and statistics.

METHODS OF MATHEMATICAL FINANCE

Springer This sequel to Brownian Motion and Stochastic Calculus by the same authors develops contingent claim pricing and optimal consumption/investment in both complete and incomplete markets, within the context of Brownian-motion-driven asset prices. The latter topic is extended to a study of equilibrium, providing conditions for existence and uniqueness of market prices which support trading by several heterogeneous agents. Although much of the incomplete-market material is available in research papers, these topics are treated for the first time in a unified manner. The book contains an extensive set of references and notes describing the field, including topics not treated in the book. This book will be of interest to researchers wishing to see advanced mathematics applied to finance. The material on optimal consumption and investment, leading to equilibrium, is addressed to the theoretical finance community. The chapters on contingent claim valuation present techniques of practical importance, especially for pricing exotic options.

MODELLING EXTREMAL EVENTS

FOR INSURANCE AND FINANCE

Springer Science & Business Media "A reader's first impression on leafing through this book is of the large number of graphs and diagrams, used to illustrate shapes of distributions...and to show real data examples in various ways. A closer reading reveals a nice mix of theory and applications, with the copious graphical illustrations alluded to. Such a mixture is of course dear to the heart of the applied probabilist/statistician, and should impress even the most ardent theorists." --MATHEMATICAL REVIEWS

ENERGY FINANCE AND ECONOMICS

ANALYSIS AND VALUATION, RISK MANAGEMENT, AND THE FUTURE OF ENERGY

John Wiley & Sons Thought leaders and experts offer the most current information and insights into energy finance Energy Finance and Economics offers the most up-to-date information and compelling insights into the finance and economics of energy. With contributions from today's thought leaders who are experts in various areas of energy finance and economics, the book provides an overview of the energy industry and addresses issues concerning energy finance and economics. The book focuses on a range of topics including corporate finance relevant to the oil and gas industry as well as addressing issues of unconventional, renewable, and alternative energy. A timely compendium of information and insights centering on topics related to energy finance Written by Betty and Russell Simkins, two experts on the topic of the economics of energy Covers special issues related to energy finance such as hybrid cars, energy hedging, and other timely topics In one handy resource, the editors have collected the best-thinking on energy finance.

MATHEMATICS AND STATISTICS FOR FINANCIAL RISK MANAGEMENT

John Wiley & Sons Mathematics and Statistics for Financial Risk Management is a practical guide to modern financial risk management for both practitioners and academics. Now in its second edition with more topics, more sample problems and more real world examples, this popular guide to financial risk management introduces readers to practical quantitative techniques for analyzing and managing financial risk. In a concise and easy-to-read style, each chapter introduces a different topic in mathematics or statistics. As different techniques are introduced, sample problems and application sections demonstrate how these techniques can be applied to actual risk management problems. Exercises at the end of each chapter and the accompanying solutions at the end of the book allow readers to practice the techniques they are learning and monitor their progress. A companion Web site includes interactive Excel spreadsheet examples and templates. Mathematics and Statistics for Financial Risk Management is an indispensable reference for today's financial risk professional.

FINANCIAL MATHEMATICS, VOLATILITY AND COVARIANCE MODELLING

VOLUME 2

Routledge This book provides an up-to-date series of advanced chapters on applied financial econometric techniques pertaining the various fields of commodities finance, mathematics & stochastics, international macroeconomics and financial econometrics. Financial Mathematics, Volatility and Covariance Modelling: Volume 2 provides a key repository on the current state of knowledge, the latest debates and recent literature on financial mathematics, volatility and covariance modelling. The first section is devoted to mathematical finance, stochastic modelling and control optimization. Chapters explore the recent financial crisis, the increase of uncertainty and volatility, and propose an alternative approach to deal with these issues. The second section covers financial volatility and covariance modelling and explores proposals for dealing with recent developments in financial econometrics This book will be useful to students and researchers in applied econometrics; academics and students seeking convenient access to an unfamiliar area. It will also be of great interest established researchers seeking a single repository on the current state of knowledge, current debates and relevant literature.

ANALYSIS OF FINANCIAL TIME SERIES

John Wiley & Sons Provides statistical tools and techniques needed to understandtoday's financial markets The Second Edition of this critically acclaimed text provides acomprehensive and systematic introduction to financial econometricmodels and their applications in modeling and predicting financialtime series data. This latest edition continues to emphasizeempirical financial data and focuses on real-world examples.Following this approach, readers will master key aspects offinancial time series, including volatility modeling, neuralnetwork applications, market microstructure and high-frequencyfinancial data, continuous-time models and Ito's Lemma, Value atRisk, multiple returns analysis, financial factor models, andeconometric modeling via computation-intensive methods. The author begins with the basic characteristics of financialtime series data, setting the foundation for the three maintopics: Analysis and application of univariate financial timeseries Return series of multiple assets Bayesian inference in finance methods This new edition is a thoroughly revised and updated text,including the addition of S-Plus® commands and illustrations.Exercises have been thoroughly updated and expanded and include themost current data, providing readers with more opportunities to putthe models and methods into practice. Among the new material addedto the text, readers will find: Consistent covariance estimation under heteroscedasticity andserial correlation Alternative approaches to volatility modeling Financial factor models State-space models Kalman filtering Estimation of stochastic diffusion models The tools provided in this text aid readers in developing adeeper understanding of financial markets through firsthandexperience in working with financial data. This is an idealtextbook for MBA students as well as a reference for researchersand professionals in business and finance.

INTRODUCTORY MATHEMATICAL ANALYSIS FOR QUANTITATIVE FINANCE

CRC Press Introductory Mathematical Analysis for Quantitative Finance is a textbook designed to enable students with little knowledge of mathematical analysis to fully engage with modern quantitative finance. A basic understanding of dimensional Calculus and Linear Algebra is assumed. The exposition of the topics is as concise as possible, since the chapters are intended to represent a preliminary contact with the mathematical concepts used in Quantitative Finance. The aim is that this book can be used as a basis for an intensive one-semester course. Features: Written with applications in mind, and maintaining mathematical rigor. Suitable for undergraduate or master's level students with an Economics or Management background. Complemented with various solved examples and exercises, to support the understanding of the subject.

AN INTRODUCTION TO THE MATHEMATICS OF FINANCIAL DERIVATIVES

Academic Press A step-by-step explanation of the mathematical models used to price derivatives. For this second edition, Salih Neftci has expanded one chapter, added six new ones, and inserted chapter-concluding exercises. He does not assume that the reader has a thorough mathematical background. His explanations of financial calculus seek to be simple and perceptive.

BUBBLES AND CONTAGION IN FINANCIAL MARKETS, VOLUME 1

AN INTEGRATIVE VIEW

Springer Understanding the formation of bubbles and the contagion mechanisms afflicting financial markets is a must as extreme volatility events leave no market untouched. Debt, equity, real estate, commodities... Shanghai, NY, or London: The severe fluctuations, explained to a large extent by contagion and the fear of new bubbles imploding, justify the newly awaken interest in the contagion and bubble dynamics as yet again the world brazes for a new global economic upheaval. Bubbles and Contagion in Financial Markets explores concepts, intuition, theory, and models. Fundamental valuation, share price development in the presence of asymmetric information, the speculative behavior of noise traders and chartists, herding and the feedback and learning mechanisms that surge within the markets are key aspects of these dynamics. Bubbles and contagion are a vast world and fascinating phenomena that escape a narrow exploration of financial markets. Hence this work looks beyond into macroeconomics, monetary policy, risk aggregation, psychology, incentive structures and many more subjects which are in part co-responsible for these events. Responding to the ever more pressing need to disentangle the dynamics by which financial local events are transmitted across the globe, this volume presents an exhaustive and integrative outlook to the subject of bubbles and contagion in financial markets. The key objective of this volume is to give the reader a comprehensive understanding of all aspects that can potentially create the conditions for the formation and bursting of bubbles, and the aftermath of such events: the contagion of macro-economic processes. Achieving a better understanding of the formation of bubbles and the impact of contagion will no doubt determine the stability of future economies – let these two volumes be the starting point for a rational approach to a seemingly irrational phenomena.

HANDBOOK OF QUANTITATIVE FINANCE AND RISK MANAGEMENT

Springer Quantitative finance is a combination of economics, accounting, statistics, econometrics, mathematics, stochastic process, and computer science and technology. Increasingly, the tools of financial analysis are being applied to assess, monitor, and mitigate risk, especially in the context of globalization, market volatility, and economic crisis. This two-volume handbook, comprised of over 100 chapters, is the most comprehensive resource in the field to date, integrating the most current theory, methodology, policy, and practical applications. Showcasing contributions from an international array of experts, the Handbook of Quantitative Finance and Risk Management is unparalleled in the breadth and depth of its coverage. Volume 1 presents an overview of quantitative finance and risk management research, covering the essential theories, policies, and empirical methodologies used in the field. Chapters provide in-depth discussion of portfolio theory and investment analysis. Volume 2 covers options and option pricing theory and risk management. Volume 3 presents a wide variety of models and analytical tools. Throughout, the handbook offers illustrative case examples, worked equations, and extensive references; additional features include chapter abstracts, keywords, and author and subject indices. From "arbitrage" to "yield spreads," the Handbook of Quantitative Finance and Risk Management will serve as an essential resource for academics, educators, students, policymakers, and practitioners.

AN INTRODUCTION TO THE MATHEMATICS OF FINANCE

A DETERMINISTIC APPROACH

Butterworth-Heinemann An Introduction to the Mathematics of Finance: A Deterministic Approach, 2e, offers a highly illustrated introduction to mathematical finance, with a special emphasis on interest rates. This revision of the McCutcheon-Scott classic follows the core subjects covered by the first professional exam required of UK actuaries, the CT1 exam. It realigns the table of contents with the CT1 exam and includes sample questions from past exams of both The Actuarial Profession and the CFA Institute. With a wealth of solved problems and interesting applications, An Introduction to the Mathematics of Finance stands alone in its ability to address the needs of its primary target audience, the actuarial student. Closely follows the syllabus for the CT1 exam of The Institute and Faculty of Actuaries Features new content and more examples Online supplements available: http://booksite.elsevier.com/9780080982403/ Includes past exam questions from The Institute and Faculty of Actuaries and the CFA Institute

THE MATHEMATICS OF MONEY MANAGEMENT

RISK ANALYSIS TECHNIQUES FOR TRADERS

John Wiley & Sons Every futures, options, and stock markets trader operates under a set of highly suspect rules and assumptions. Are you risking your career on yours? Exceptionally clear and easy to use, The Mathematics of Money Management substitutes precise mathematical modeling for the subjective decision-making processes many traders and serious investors depend on. Step-by-step, it unveils powerful strategies for creating and using key money management formulas--based on the rules of probability and modern portfolio theory--that maximizes the potential gains for the level of risk you are assuming. With them, you'll determine the payoffs and consequences of any potential trading decision and obtain the highest potential growth for your specified level of risk. You'll quickly decide: What markets to trade in and at what quantities When to add or subtract funds from an account How to reinvest trading profits for maximum yield The Mathematics of Money Management provides the missing element in modern portfolio theory that weds optimal f to the optimal portfolio.

NATURAL COMPUTING IN COMPUTATIONAL FINANCE

Springer Science & Business Media Recent years have seen the widespread application of Natural Computing algorithms (broadly defined in this context as computer algorithms whose design draws inspiration from phenomena in the natural world) for the purposes of financial modelling and optimisation. A related stream of work has also seen the application of learning mechanisms drawn from Natural Computing algorithms for the purposes of agent-based modelling in finance and economics. In this book we have collected a series of chapters which illustrate these two faces of Natural Computing. The first part of the book illustrates how algorithms inspired by the natural world can be used as problem solvers to uncover and optimise financial models. The second part of the book examines a number agent-based simulations of financial systems. This book follows on from Natural Computing in Computational Finance (Volume 100 in Springer's Studies in Computational Intelligence series) which in turn arose from the success of EvoFIN 2007, the very first European Workshop on Evolutionary Computation in Finance & Economics held in Valencia, Spain in April 2007.

MARKET RISK ANALYSIS, PRICING, HEDGING AND TRADING FINANCIAL INSTRUMENTS

John Wiley & Sons Written by leading market risk academic, Professor Carol Alexander, Pricing, Hedging and Trading Financial Instruments forms part three of the Market Risk Analysis four volume set. This book is an in-depth, practical and accessible guide to the models that are used for pricing and the strategies that are used for hedging financial instruments, and to the markets in which they trade. It provides a comprehensive, rigorous and accessible introduction to bonds, swaps, futures and forwards and options, including variance swaps, volatility indices and their futures and options, to stochastic volatility models and to modelling the implied and local volatility surfaces. All together, the MARKET RISK ANALYSIS four volume set illustrates virtually every concept or formula with a practical, numerical example or a longer, empirical case study. Across all four volumes there are approximately 300 numerical and empirical examples, 400 graphs and figures 30 case studies many of which are contained in interactive Excel spreadsheets available from the accompanying CD-ROM. In this volume alone there are over 200 spreadsheets in 25 workbooks. Here are just some of he illustrative empirical examples and case studies in this volume: Duration-Convexity approximation to bond portfolios, and portfolio immunization; Pricing floaters and vanilla, basis and variance swaps; Coupon stripping and yield curve fitting; Proxy hedging, and hedging international securities and energy futures portfolios; Pricing models for European exotics, including barriers, Asians, look-backs, choosers, capped, contingent, power, quanto, compo, exchange, 'best-of' and spread options; Libor model calibration; Dynamic models for implied volatility based on principal component analysis; Calibration of stochastic volatility models (Matlab code); Simulations from stochastic volatility and jump models; Duration, PV01 and volatility invariant cash flow mappings; Delta-gamma-theta-vega mappings for options portfolios; Volatility beta mapping to volatility indices.

MEASURE, PROBABILITY, AND MATHEMATICAL FINANCE

A PROBLEM-ORIENTED APPROACH

John Wiley & Sons An introduction to the mathematical theory and financial models developed and used on Wall Street Providing both a theoretical and practical approach to the underlying mathematical theory behind financial models, Measure, Probability, and Mathematical Finance: A Problem-Oriented Approach presents important concepts and results in measure theory, probability theory, stochastic processes, and stochastic calculus. Measure theory is indispensable to the rigorous development of probability theory and is also necessary to properly address martingale measures, the change of numeraire theory, and LIBOR market models. In addition, probability theory is presented to facilitate the development of stochastic processes, including martingales and Brownian motions, while stochastic processes and stochastic calculus are discussed to model asset prices and develop derivative pricing models. The authors promote a problem-solving approach when applying mathematics in real-world situations, and readers are encouraged to address theorems and problems with mathematical rigor. In addition, Measure, Probability, and Mathematical Finance features: A comprehensive list of concepts and theorems from measure theory, probability theory, stochastic processes, and stochastic calculus Over 500 problems with hints and select solutions to reinforce basic concepts and important theorems Classic derivative pricing models in mathematical finance that have been developed and published since the seminal work of Black and Scholes Measure, Probability, and Mathematical Finance: A Problem-Oriented Approach is an ideal textbook for introductory quantitative courses in business, economics, and mathematical finance at the upper-undergraduate and graduate levels. The book is also a useful reference for readers who need to build their mathematical skills in order to better understand the mathematical theory of derivative pricing models.

LECTURES ON STOCHASTIC PROGRAMMING: MODELING AND THEORY, THIRD EDITION

SIAM An accessible and rigorous presentation of contemporary models and ideas of stochastic programming, this book focuses on optimization problems involving uncertain parameters for which stochastic models are available. Since these problems occur in vast, diverse areas of science and engineering, there is much interest in rigorous ways of formulating, analyzing, and solving them. This substantially revised edition presents a modern theory of stochastic programming, including expanded and detailed coverage of sample complexity, risk measures, and distributionally robust optimization. It adds two new chapters that provide readers with a solid understanding of emerging topics; updates Chapter 6 to now include a detailed discussion of the interchangeability principle for risk measures; and presents new material on formulation and numerical approaches to solving periodical multistage stochastic programs. Lectures on Stochastic Programming: Modeling and Theory, Third Edition is written for researchers and graduate students working on theory and applications of optimization, with the hope that it will encourage them to apply stochastic programming models and undertake further studies of this fascinating and rapidly developing area.

THE MATHEMATICS OF FINANCIAL MODELING AND INVESTMENT MANAGEMENT

John Wiley & Sons the mathematics of financial modeling & investment management The Mathematics of Financial Modeling & Investment Management covers a wide range of technical topics in mathematics and finance-enabling the investment management practitioner, researcher, or student to fully understand the process of financial decision-making and its economic foundations. This comprehensive resource will introduce you to key mathematical techniques-matrix algebra, calculus, ordinary differential equations, probability theory, stochastic calculus, time series analysis, optimization-as well as show you how these techniques are successfully implemented in the world of modern finance. Special emphasis is placed on the new mathematical tools that allow a deeper understanding of financial econometrics and financial economics. Recent advances in financial econometrics, such as tools for estimating and representing the tails of the distributions, the analysis of correlation phenomena, and dimensionality reduction through factor analysis and cointegration are discussed in depth. Using a wealth of real-world examples, Focardi and Fabozzi simultaneously show both the mathematical techniques and the areas in finance where these techniques are applied. They also cover a variety of useful financial applications, such as: * Arbitrage pricing * Interest rate modeling * Derivative pricing * Credit risk modeling * Equity and bond portfolio management * Risk management * And much more Filled with in-depth insight and expert advice, The Mathematics of Financial Modeling & Investment Management clearly ties together financial theory and mathematical techniques.

AN INTRODUCTION TO FINANCIAL OPTION VALUATION

MATHEMATICS, STOCHASTICS AND COMPUTATION

Cambridge University Press This book is intended for use in a rigorous introductory PhD level course in econometrics, or in a field course in econometric theory. It covers the measure-theoretical foundation of probability theory, the multivariate normal distribution with its application to classical linear regression analysis, various laws of large numbers, central limit theorems and related results for independent random variables as well as for stationary time series, with applications to asymptotic inference of M-estimators, and maximum likelihood theory. Some chapters have their own appendices containing the more advanced topics and/or difficult proofs. Moreover, there are three appendices with material that is supposed to be known. Appendix I contains a comprehensive review of linear algebra, including all the proofs. Appendix II reviews a variety of mathematical topics and concepts that are used throughout the main text, and Appendix III reviews complex analysis. Therefore, this book is uniquely self-contained.

MASTERING FINANCIAL CALCULATIONS

A STEP-BY-STEP GUIDE TO THE MATHEMATICS OF FINANCIAL MARKET INSTRUMENTS

Pearson UK Success in today's sophisticated financial markets depends on a firm understanding of key financial concepts and mathematical techniques. Mastering Financial Calculations explains them in a clear, comprehensive way — so even if your mathematical background is limited, you'll thoroughly grasp what you need to know. Mastering Financial Calculations starts by introducing the fundamentals of financial market arithmetic, including the core concepts of discounting, net present value, effective yields, and cash flow analysis. Next, walk step-by-step through the essential calculations and financial techniques behind money markets and futures, zero-coupon analysis, interest rate and currency swaps, bonds, foreign exchange, options, and more. Making use of many worked examples and practical exercises, the book explains challenging concepts such as forward pricing, duration analysis, swap valuation, and option pricing - all with exceptional clarity. Whether you are a trader, fund manager, corporate treasurer, programmer, accountant, risk manager, or market student, you'll gain the ability to manipulate and apply these techniques with speed and confidence.

ELEMENTS OF MATHEMATICS FOR ECONOMICS AND FINANCE

Springer Science & Business Media This book equips undergraduates with the mathematical skills required for degree courses in economics, finance, management, and business studies. The fundamental ideas are described in the simplest mathematical terms, highlighting threads of common mathematical theory in the various topics. Coverage helps readers become confident and competent in the use of mathematical tools and techniques that can be applied to a range of problems.