Computational Finance Using C And C

Computational Finance Using C and C#

Computational Finance Using C and C#: Derivatives and Valuation, Second Edition provides derivatives pricing information for equity derivatives, interest rate derivatives, foreign exchange derivatives, and credit derivatives. By providing free access to code from a variety of computer languages, such as Visual Basic/Excel, C++, C, and C#, it gives readers stand-alone examples that they can explore before delving into creating their own applications. It is written for readers with backgrounds in basic calculus, linear algebra, and probability. Strong on mathematical theory, this second edition helps empower readers to solve their own problems. *Features new programming problems, examples, and exercises for each chapter. *Includes freely-accessible source code in languages such as C, C++, VBA, C#, and Excel.. *Includes a new chapter on the history of finance which also covers the 2008 credit crisis and the use of mortgage backed securities, CDSs and CDOs. *Emphasizes mathematical theory. - Features new programming problems, examples, and exercises with solutions added to each chapter - Includes freely-accessible source code in languages such as C, C++, VBA, C#, Excel, - Includes a new chapter on the credit crisis of 2008 - Emphasizes mathematical theory

Computational Finance Using C and C#

In Computational Finance Using C and C# George Levy raises computational finance to the next level using the languages of both standard C and C#. The inclusion of both these languages enables readers to match their use of the book to their firm's internal software and code requirements. Levy also provides derivatives pricing information for: — equity derivates: vanilla options, quantos, generic equity basket options — interest rate derivatives: FRAs, swaps, quantos — foreign exchange derivatives: FX forwards, FX options — credit derivatives: credit default swaps, defaultable bonds, total return swaps. Computational Finance Using C and C# by George Levy is supported by extensive web resources. Available for purchase on the multi-tier website are e versions of this book and Levy's first book, Computational Finance: Numerical Methods for Pricing Financial Derivatives. Purchasers of the print or e-book can download free software consisting of executable files, configuration files, and results files. With these files the user can run the example portfolio application in Chapter 8 and change the portfolio composition and the attributes of the deals. In addition, Upgrade Software is available on the website for a small fee, and includes: • Code to run all the C, C# and Excel examples in the book • Complete C source code for the Analytics_Mathlib maths library that is used in the book • C# source code, market data and portfolio files for the portfolio application described in Chapter 8 All the C/C# software can be compiled using either Visual Studio .NET 2005, or the freely available Microsoft Visual C#/C++ 2005 Express Editions. With this software, the user can open the files and create new deals, new instruments, and change the attributes of the deals by editing the code and recompiling it. This serves as a template that a user can run to customize the deals for their personal, everyday use. * Complete financial instrument pricing code in standard C and C# available to book buyers on companion website * Illustrates the use of C# design patterns, including dictionaries, abstract classes, and .NET InteropServices.

Financial Instrument Pricing Using C++

An integrated guide to C++ and computational finance This complete guide to C++ and computational finance is a follow-up and major extension to Daniel J. Duffy's 2004 edition of Financial Instrument Pricing Using C++. Both C++ and computational finance have evolved and changed dramatically in the last ten years and this book documents these improvements. Duffy focuses on these developments and the advantages for

the quant developer by: Delving into a detailed account of the new C++11 standard and its applicability to computational finance. Using de-facto standard libraries, such as Boost and Eigen to improve developer productivity. Developing multiparadigm software using the object-oriented, generic, and functional programming styles. Designing flexible numerical algorithms: modern numerical methods and multiparadigm design patterns. Providing a detailed explanation of the Finite Difference Methods through six chapters, including new developments such as ADE, Method of Lines (MOL), and Uncertain Volatility Models. Developing applications, from financial model to algorithmic design and code, through a coherent approach. Generating interoperability with Excel add-ins, C#, and C++/CLI. Using random number generation in C++11 and Monte Carlo simulation. Duffy adopted a spiral model approach while writing each chapter of Financial Instrument Pricing Using C++ 2e: analyse a little, design a little, and code a little. Each cycle ends with a working prototype in C++ and shows how a given algorithm or numerical method works. Additionally, each chapter contains non-trivial exercises and projects that discuss improvements and extensions to the material. This book is for designers and application developers in computational finance, and assumes the reader has some fundamental experience of C++ and derivatives pricing. HOW TO RECEIVE THE SOURCE CODE Once you have purchased a copy of the book please send an email to the author dduffyATdatasim.nl requesting your personal and non-transferable copy of the source code. Proof of purchase is needed. The subject of the mail should be “C++ Book Source Code Request”. You will receive a reply with a zip file attachment.

Computational Finance

Accompanying CD-ROM contains ... \"working computer code, demonstration applications, and also PDF versions of several research articles that are referred to in the book.\" -- d.j.

Natural Computing in Computational Finance

This book follows on from Natural Computing in Computational Finance Volumes I, II and III. As in the previous volumes of this series, the book consists of a series of chapters each of which was selected following a rigorous, peer-reviewed, selection process. The chapters illustrate the application of a range of cutting-edge natural computing and agent-based methodologies in computational finance and economics. The applications explored include option model calibration, financial trend reversal detection, enhanced indexation, algorithmic trading, corporate payout determination and agent-based modeling of liquidity costs, and trade strategy adaptation. While describing cutting edge applications, the chapters are written so that they are accessible to a wide audience. Hence, they should be of interest to academics, students and practitioners in the fields of computational finance and economics. which was selected following a rigorous, peer-reviewed, selection process. The chapters illustrate the application of a range of cutting-edge natural computing and agent-based methodologies in computational finance and economics. The applications explored include option model calibration, financial trend reversal detection, enhanced indexation, algorithmic trading, corporate payout determination and agent-based modeling of liquidity costs, and trade strategy adaptation. While describing cutting edge applications, the chapters are written so that they are accessible to a wide audience. Hence, they should be of interest to academics, students and practitioners in the fields of computational finance and economics. The applications explored include option model calibration, financial trend reversal detection, enhanced indexation, algorithmic trading, corporate payout determination and agent-based modeling of liquidity costs, and trade strategy adaptation. While describing cutting edge applications, the chapters are written so that they are accessible to a wide audience. Hence, they should be of interest to academics, students and practitioners in the fields of computational finance and economics. written so that they are accessible to a wide audience. Hence, they should be of interest to academics, students and practitioners in the fields of computational finance and economics.

Handbook of Quantitative Finance and Risk Management

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.

Modern Computational Finance

Arguably the strongest addition to numerical finance of the past decade, Algorithmic Adjoint Differentiation (AAD) is the technology implemented in modern financial software to produce thousands of accurate risk sensitivities, within seconds, on light hardware. AAD recently became a centerpiece of modern financial systems and a key skill for all quantitative analysts, developers, risk professionals or anyone involved with derivatives. It is increasingly taught in Masters and PhD programs in finance. Danske Bank's wide scale implementation of AAD in its production and regulatory systems won the In-House System of the Year 2015 Risk award. The Modern Computational Finance books, written by three of the very people who designed Danske Bank's systems, offer a unique insight into the modern implementation of financial models. The volumes combine financial modelling, mathematics and programming to resolve real life financial problems and produce effective derivatives software. This volume is a complete, self-contained learning reference for AAD, and its application in finance. AAD is explained in deep detail throughout chapters that gently lead readers from the theoretical foundations to the most delicate areas of an efficient implementation, such as memory management, parallel implementation and acceleration with expression templates. The book comes with professional source code in C++, including an efficient, up to date implementation of AAD and a generic parallel simulation library. Modern C++, high performance parallel programming and interfacing C++ with Excel are also covered. The book builds the code step-by-step, while the code illustrates the concepts and notions developed in the book.

Modeling Derivatives in C++

This book is the definitive and most comprehensive guide to modeling derivatives in C++ today. Providing readers with not only the theory and math behind the models, as well as the fundamental concepts of financial engineering, but also actual robust object-oriented C++ code, this is a practical introduction to the most important derivative models used in practice today, including equity (standard and exotics including barrier, lookback, and Asian) and fixed income (bonds, caps, swaptions, swaps, credit) derivatives. The book provides complete C++ implementations for many of the most important derivatives and interest rate pricing models used on Wall Street including Hull-White, BDT, CIR, HJM, and LIBOR Market Model. London illustrates the practical and efficient implementations of these models in real-world situations and discusses the mathematical underpinnings and derivation of the models in a detailed yet accessible manner illustrated by many examples with numerical data as well as real market data. A companion CD contains quantitative libraries, tools, applications, and resources that will be of value to those doing quantitative programming and analysis in C++. Filled with practical advice and helpful tools, Modeling Derivatives in C++ will help readers succeed in understanding and implementing C++ when modeling all types of derivatives.

Computational Finance

The book covers a wide range of topics, yet essential, in Computational Finance (CF), understood as a mix of Finance, Computational Statistics, and Mathematics of Finance. In that regard it is unique in its kind, for it touches upon the basic principles of all three main components of CF, with hands-on examples for programming models in R. Thus, the first chapter gives an introduction to the Principles of Corporate Finance: the markets of stock and options, valuation and economic theory, framed within Computation and Information Theory (e.g. the famous Efficient Market Hypothesis is stated in terms of computational complexity, a new perspective). Chapters 2 and 3 give the necessary tools of Statistics for analyzing financial time series, it also goes in depth into the concepts of correlation, causality and clustering. Chapters 4 and 5 review the most important discrete and continuous models for financial time series. Each model is provided with an example program in R. Chapter 6 covers the essentials of Technical Analysis (TA) and Fundamental Analysis. This chapter is suitable for people outside academics and into the world of financial investments, as a primer in the methods of charting and analysis of value for stocks, as it is done in the financial industry. Moreover, a mathematical foundation to the seemly ad-hoc methods of TA is given, and this is new in a presentation of TA. Chapter 7 reviews the most important heuristics for optimization: simulated annealing, genetic programming, and ant colonies (swarm intelligence) which is material to feed the computer savvy readers. Chapter 8 gives the basic principles of portfolio management, through the mean-variance model, and optimization under different constraints which is a topic of current research in computation, due to its complexity. One important aspect of this chapter is that it teaches how to use the powerful tools for portfolio analysis from the RMetrics R-package. Chapter 9 is a natural continuation of chapter 8 into the new area of research of online portfolio selection. The basic model of the universal portfolio of Cover and approximate methods to compute are also described.

Agent-Based Computational Economics

This book aims to answer two questions that are fundamental to the study of agent-based economic models: what is agent-based computational economics and why do we need agent-based economic modelling of economy? This book provides a review of the development of agent-based computational economics (ACE) from a perspective on how artificial economic agents are designed under the influences of complex sciences, experimental economics, artificial intelligence, evolutionary biology, psychology, anthropology and neuroscience. This book begins with a historical review of ACE by tracing its origins. From a modelling viewpoint, ACE brings truly decentralized procedures into market analysis, from a single market to the whole economy. This book also reviews how experimental economics and artificial intelligence have shaped the development of ACE. For the former, the book discusses how ACE models can be used to analyse the economic consequences of cognitive capacity, personality and cultural inheritance. For the latter, the book covers the various tools used to construct artificial adaptive agents, including reinforcement learning, fuzzy decision rules, neural networks, and evolutionary computation. This book will be of interest to graduate students researching computational economics, experimental economics, behavioural economics, and research methodology.

Nonlinear Dynamics in Economics, Finance and the Social Sciences

Over the last two decades there has been a great deal of research into nonlinear dynamic models in economics, finance and the social sciences. This book contains twenty papers that range over very recent applications in these areas. Topics covered include structural change and economic growth, disequilibrium dynamics and economic policy as well as models with boundedly rational agents. The book illustrates some of the most recent research tools in this area and will be of interest to economists working in economic dynamics and to mathematicians interested in seeing ideas from nonlinear dynamics and complexity theory applied to the economic sciences.

Decision Technologies for Computational Finance

This volume contains selected papers that were presented at the International Conference COMPUTATIONAL FINANCE 1997 held at London Business School on December 15-17 1997. Formerly known as Neural Networks in the Capital Markets (NNCM), this series of meetings has emerged as a truly multi-disciplinary international conference and provided an international focus for innovative research on the application of a multiplicity of advanced decision technologies to many areas of financial engineering. It has drawn upon theoretical advances in financial economics and robust methodological developments in the statistical, econometric and computer sciences. To reflect its multi-disciplinary nature, the NNCM conference has adopted the new title COMPUTATIONAL FINANCE. The papers in this volume are organised in six parts. Market Dynamics and Risk, Trading and Arbitrage strategies, Volatility and Options, Term-Structure and Factor models, Corporate Distress Models and Advances on Methodology. This years' acceptance rate (38%) reflects both the increasing interest in the conference and the Programme Committee's efforts to improve the quality of the meeting year-on-year. I would like to thank the members of the programme committee for their efforts in refereeing the papers. I also would like to thank the members of the computational finance group at London Business School and particularly Neil Burgess, Peter Bolland, Yves Bentz, and Nevil Towers for organising the meeting.

Numerical Methods in Computational Finance

This book is a detailed and step-by-step introduction to the mathematical foundations of ordinary and partial differential equations, their approximation by the finite difference method and applications to computational finance. The book is structured so that it can be read by beginners, novices and expert users. Part A Mathematical Foundation for One-Factor Problems Chapters 1 to 7 introduce the mathematical and numerical analysis concepts that are needed to understand the finite difference method and its application to computational finance. Part B Mathematical Foundation for Two-Factor Problems Chapters 8 to 13 discuss a number of rigorous mathematical techniques relating to elliptic and parabolic partial differential equations in two space variables. In particular, we develop strategies to preprocess and modify a PDE before we approximate it by the finite difference method, thus avoiding ad-hoc and heuristic tricks. Part C The Foundations of the Finite Difference Method (FDM) Chapters 14 to 17 introduce the mathematical background to the finite difference method for initial boundary value problems for parabolic PDEs. It encapsulates all the background information to construct stable and accurate finite difference schemes. Part D Advanced Finite Difference Schemes for Two-Factor Problems Chapters 18 to 22 introduce a number of modern finite difference methods to approximate the solution of two factor partial differential equations. This is the only book we know of that discusses these methods in any detail. Part E Test Cases in Computational Finance Chapters 23 to 26 are concerned with applications based on previous chapters. We discuss finite difference schemes for a wide range of one-factor and two-factor problems. This book is suitable as an entry-level introduction as well as a detailed treatment of modern methods as used by industry quants and MSc/MFE students in finance. The topics have applications to numerical analysis, science and engineering. More on computational finance and the author’s online courses, see www.datasim.nl.

Tools for Computational Finance

The disciplines of financial engineering and numerical computation differ greatly, however computational methods are used in a number of ways across the field of finance. It is the aim of this book to explain how such methods work in financial engineering; specifically the use of numerical methods as tools for computational finance. By concentrating on the field of option pricing, a core task of financial engineering and risk analysis, this book explores a wide range of computational tools in a coherent and focused manner and will be of use to the entire field of computational finance. Starting with an introductory chapter that presents the financial and stochastic background, the remainder of the book goes on to detail computational methods using both stochastic and deterministic approaches. Now in its fifth edition, Tools for Computational Finance has been significantly revised and contains: A new chapter on incomplete markets which links to new appendices on Viscosity solutions and the Dupire equation; Several new parts throughout

the book such as that on the calculation of sensitivities (Sect. 3.7) and the introduction of penalty methods and their application to a two-factor model (Sect. 6.7) Additional material in the field of analytical methods including Kim's integral representation and its computation Guidelines for comparing algorithms and judging their efficiency An extended chapter on finite elements that now includes a discussion of two-asset options Additional exercises, figures and references Written from the perspective of an applied mathematician, methods are introduced as tools within the book for immediate and straightforward application. A 'learning by calculating' approach is adopted throughout this book enabling readers to explore several areas of the financial world. Interdisciplinary in nature, this book will appeal to advanced undergraduate students in mathematics, engineering and other scientific disciplines as well as professionals in financial engineering.

Investment- und Risikomanagement

Anhand vieler Beispiele und empirischer Fallstudien erörtern die Autoren anschaulich institutionelle und methodische Grundlagen. Ausführlich werden Investments in Aktien, Zinstitel und Derivate behandelt; Futures, Optionen und Swaps sind dabei jeweils eigene Kapitel gewidmet. Immobilieninvestments, internationale Portfolio-Diversifikation und Value-at-Risk runden die breit angelegte Einführung ab. In der 4. Auflage neu aufgenommen: Abschnitte zu weiteren Modellkonzeptionen Stylized Facts empirischer Renditezeitreihen Prospect-Theorie Theorie effizienter Märkte Portfolioheuristiken Zinsprognose Preisbildung bei Rohstofffutures Risikomanagement von Optionspositionen Rohstoffinvestments

Handbook of Computational Finance

Any financial asset that is openly traded has a market price. Except for extreme market conditions, market price may be more or less than a "fair" value. Fair value is likely to be some complicated function of the current intrinsic value of tangible or intangible assets underlying the claim and our assessment of the characteristics of the underlying assets with respect to the expected rate of growth, future dividends, volatility, and other relevant market factors. Some of these factors that affect the price can be measured at the time of a transaction with reasonably high accuracy. Most factors, however, relate to expectations about the future and to subjective issues, such as current management, corporate policies and market environment, that could affect the future financial performance of the underlying assets. Models are thus needed to describe the stochastic factors and environment, and their implementations inevitably require computational finance tools.

Numerical Methods in Finance with C++

Driven by concrete computational problems in quantitative finance, this book provides aspiring quant developers with the numerical techniques and programming skills they need. The authors start from scratch, so the reader does not need any previous experience of C++. Beginning with straightforward option pricing on binomial trees, the book gradually progresses towards more advanced topics, including nonlinear solvers, Monte Carlo techniques for path-dependent derivative securities, finite difference methods for partial differential equations, and American option pricing by solving a linear complementarity problem. Further material, including solutions to all exercises and C++ code, is available online. The book is ideal preparation for work as an entry-level quant programmer and it gives readers the confidence to progress to more advanced skill sets involving C++ design patterns as applied in finance.

Computational Intelligence: A Compendium

Computational Intelligence: A Compendium presents a well structured overview about this rapidly growing field with contributions from leading experts in Computational Intelligence. The main focus of the compendium is on applied methods, tried-and-proven as being effective to realworld problems, which is especially useful for practitioners, researchers, students and also newcomers to the field. This state-of-handbook-style book has contributions by leading experts.

Implementing Models in Quantitative Finance: Methods and Cases

This book puts numerical methods in action for the purpose of solving practical problems in quantitative finance. The first part develops a toolkit in numerical methods for finance. The second part proposes twenty self-contained cases covering model simulation, asset pricing and hedging, risk management, statistical estimation and model calibration. Each case develops a detailed solution to a concrete problem arising in applied financial management and guides the user towards a computer implementation. The appendices contain \"crash courses\" in VBA and Matlab programming languages.

Quantitative Finance with Python

Quantitative Finance with Python: A Practical Guide to Investment Management, Trading and Financial Engineering bridges the gap between the theory of mathematical finance and the practical applications of these concepts for derivative pricing and portfolio management. The book provides students with a very hands-on, rigorous introduction to foundational topics in quant finance, such as options pricing, portfolio optimization and machine learning. Simultaneously, the reader benefits from a strong emphasis on the practical applications of these concepts for institutional investors. Features Useful as both a teaching resource and as a practical tool for professional investors. Ideal textbook for first year graduate students in quantitative finance programs, such as those in master’s programs in Mathematical Finance, Quant Finance or Financial Engineering. Includes a perspective on the future of quant finance techniques, and in particular covers some introductory concepts of Machine Learning. Free-to-access repository with Python codes available at www.routledge.com/ 9781032014432 and on https://github.com/lingyixu/Quant-Finance-With-Python-Code.

Financial Modelling

Financial modelling Theory, Implementation and Practice with MATLAB Source Jörg Kienitz and Daniel Wetterau Financial Modelling - Theory, Implementation and Practice with MATLAB Source is a unique combination of quantitative techniques, the application to financial problems and programming using Matlab. The book enables the reader to model, design and implement a wide range of financial models for derivatives pricing and asset allocation, providing practitioners with complete financial modelling workflow, from model choice, deriving prices and Greeks using (semi-) analytic and simulation techniques, and calibration even for exotic options. The book is split into three parts. The first part considers financial markets in general and looks at the complex models needed to handle observed structures, reviewing models based on diffusions including stochastic-local volatility models and (pure) jump processes. It shows the possible risk-neutral densities, implied volatility surfaces, option pricing and typical paths for a variety of models including SABR, Heston, Bates, Bates-Hull-White, Displaced-Heston, or stochastic volatility versions of Variance Gamma, respectively Normal Inverse Gaussian models and finally, multi-dimensional models. The stochastic-local-volatility Libor market model with time-dependent parameters is considered and as an application how to price and risk-manage CMS spread products is demonstrated. The second part of the book deals with numerical methods which enables the reader to use the models of the first part for pricing and risk management, covering methods based on direct integration and Fourier transforms, and detailing the implementation of the COS, CONV, Carr-Madan method or Fourier-Space-Time Stepping. This is applied to pricing of European, Bermudan and exotic options as well as the calculation of the Greeks. The Monte Carlo simulation technique is outlined and bridge sampling is discussed in a Gaussian setting and for Lévy processes. Computation of Greeks is covered using likelihood ratio methods and adjoint techniques. A chapter on state-of-the-art optimization algorithms rounds up the toolkit for applying advanced mathematical models to financial problems and the last chapter in this section of the book also serves as an introduction to model risk. The third part is devoted to the usage of Matlab, introducing the software package by describing the basic functions applied for financial engineering. The programming is approached from an object-oriented perspective with examples to propose a framework for calibration, hedging and the adjoint method for calculating Greeks in a Libor market model. Source code used for producing the results and analysing the models is provided on the author's dedicated website,

http://www.mathworks.de/matlabcentral/fileexchange/authors/246981.

Computational Finance 1999

This book covers the techniques of data mining, knowledge discovery, genetic algorithms, neural networks, bootstrapping, machine learning, and Monte Carlo simulation. Computational finance, an exciting new cross-disciplinary research area, draws extensively on the tools and techniques of computer science, statistics, information systems, and financial economics. This book covers the techniques of data mining, knowledge discovery, genetic algorithms, neural networks, bootstrapping, machine learning, and Monte Carlo simulation. These methods are applied to a wide range of problems in finance, including risk management, asset allocation, style analysis, dynamic trading and hedging, forecasting, and option pricing. The book is based on the sixth annual international conference Computational Finance 1999, held at New York University's Stern School of Business.

Mathematical Finance

The year 2000 is the centenary year of the publication of Bachelier's thesis which - together with Harry Markovitz Ph. D. dissertation on portfolio selection in 1952 and Fischer Black's and Myron Scholes' solution of an option pricing problem in 1973 - is considered as the starting point of modern finance as a mathematical discipline. On this remarkable anniversary the workshop on mathematical finance held at the University of Konstanz brought together practitioners, economists and mathematicians to discuss the state of the art. Apart from contributions to the known discrete, Brownian, and Lvy process models, first attempts to describe a market in a reasonable way by a fractional Brownian motion model are presented, opening many new aspects for practitioners and new problems for mathematicians. As most dynamical financial problems are stochastic filtering or control problems many talks presented adaptations of control methods and techniques to the classical financial problems in portfolio selection irreversible investment risk sensitive asset allocation capital asset pricing hedging contingent claims option pricing interest rate theory. The contributions of practitioners link the theoretical results to the steadily increasing flow of real world problems from financial institutions into mathematical laboratories. The present volume reflects this exchange of theoretical and applied results, methods and techniques that made the workshop a fruitful contribution to the interdisciplinary work in mathematical finance.

Soft-Computing in Capital Market

Computational Finance, an exciting new cross-disciplinary research area, depends extensively on the tools and techniques of computer science, statistics, information systems and financial economics for educating the next generation of financial researchers, analysts, risk managers, and financial information technology professionals. This new discipline, sometimes also referred to as \"Financial Engineering\" or \"Quantitative Finance\" needs professionals with extensive skills both in finance and mathematics along with specialization in computer science. Soft-Computing in Capital Market hopes to fulfill the need of applications of this offshoot of the technology by providing a diverse collection of cross-disciplinary research. This edited volume covers most of the recent, advanced research and practical areas in computational finance, starting from traditional fundamental analysis using algebraic and geometric tools to the logic of science to explore information from financial data without prejudice. Utilizing various methods, computational finance researchers aim to determine the financial risk with greater precision that certain financial instruments create. In this line of interest, twelve papers dealing with new techniques and/or novel applications related to computational intelligence, such as statistics, econometrics, neural- network, and various numerical algorithms are included in this volume.

Wavelet Neural Networks

A step-by-step introduction to modeling, training, and forecasting using wavelet networks Wavelet Neural

Networks: With Applications in Financial Engineering, Chaos, and Classification presents the statistical model identification framework that is needed to successfully apply wavelet networks as well as extensive comparisons of alternate methods. Providing a concise and rigorous treatment for constructing optimal wavelet networks, the book links mathematical aspects of wavelet network construction to statistical modeling and forecasting applications in areas such as finance, chaos, and classification. The authors ensure that readers obtain a complete understanding of model identification by providing in-depth coverage of both model selection and variable significance testing. Featuring an accessible approach with introductory coverage of the basic principles of wavelet analysis, Wavelet Neural Networks: With Applications in Financial Engineering, Chaos, and Classification also includes: • Methods that can be easily implemented or adapted by researchers, academics, and professionals in identification and modeling for complex nonlinear systems and artificial intelligence • Multiple examples and thoroughly explained procedures with numerous applications ranging from financial modeling and financial engineering, time series prediction and construction of confidence and prediction intervals, and classification and chaotic time series prediction • An extensive introduction to neural networks that begins with regression models and builds to more complex frameworks • Coverage of both the variable selection algorithm and the model selection algorithm for wavelet networks in addition to methods for constructing confidence and prediction intervals Ideal as a textbook for MBA and graduate-level courses in applied neural network modeling, artificial intelligence, advanced data analysis, time series, and forecasting in financial engineering, the book is also useful as a supplement for courses in informatics, identification and modeling for complex nonlinear systems, and computational finance. In addition, the book serves as a valuable reference for researchers and practitioners in the fields of mathematical modeling, engineering, artificial intelligence, decision science, neural networks, and finance and economics.

Peter Carr Gedenkschrift: Research Advances In Mathematical Finance

This Gedenkschrift for Peter Carr, our dear friend and colleague who suddenly left us on March 1, 2022, was organized to honor the life and lasting contributions of Peter to Quantitative Finance. A group of Peter's co-authors and professional friends contributed chapters for this Gedenkschrift shortly after his passing. The papers were received by September 15, 2022 and some were presented at the Peter Carr Gedenkschrift Conference held at the Robert H Smith School of Business on November 11, 2022. The contributed papers cover a wide range of topics corresponding to the vast range of Peter's interests. Each paper represents new research results in recognition of Peter's scholarly activities. The book serves as an important marker for the research knowledge existing at the time of the Gedenkschrift's publication on a number of topics within quantitative finance. It reflects the diverse interactions between mathematics and finance and illustrates, for those interested, the breadth and depth of this development. The book also presents a collection of tributes to Peter from family and friends including those made at his Memorial Service on March 19, 2022. The result is hopefully a more complete testament to a personal and professional life well lived, and unexpectedly cut short.

Computational Finance and Its Applications II

Featuring papers from the Second International Conference on Computational Finance and its Applications, the text includes papers that encompass a wide range of topics such as risk management, derivatives pricing, credit risk, trading strategies, portfolio management and asset allocation, and market analysis.

Numerical Solution Of The American Option Pricing Problem, The: Finite Difference And Transform Approaches

The early exercise opportunity of an American option makes it challenging to price and an array of approaches have been proposed in the vast literature on this topic. In The Numerical Solution of the American Option Pricing Problem, Carl Chiarella, Boda Kang and Gunter Meyer focus on two numerical approaches that have proved useful for finding all prices, hedge ratios and early exercise boundaries of an

American option. One is a finite difference approach which is based on the numerical solution of the partial differential equations with the free boundary problem arising in American option pricing, including the method of lines, the component wise splitting and the finite difference with PSOR. The other approach is the integral transform approach which includes Fourier or Fourier Cosine transforms. Written in a concise and systematic manner, Chiarella, Kang and Meyer explain and demonstrate the advantages and limitations of each of them based on their and their co-workers' experiences with these approaches over the years.

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Mathematical Finance. Theory

The aim of these two books is to provide the basic theoretical concepts and the best practice concerning the mathematical finance which is unescapable to understand the way modern financial markets operate. Thanks to these fundamental concepts, which are completely concentrated on a deterministic modelization of the markets, students are ready to approach more advanced courses focused on the modern area of financial math where the deterministic assumption is left and stochastic assumptions concerning the evolution of the involved variables are included.

Novel Methods in Computational Finance

This book discusses the state-of-the-art and open problems in computational finance. It presents a collection of research outcomes and reviews of the work from the STRIKE project, an FP7 Marie Curie Initial Training Network (ITN) project in which academic partners trained early-stage researchers in close cooperation with a broader range of associated partners, including from the private sector. The aim of the project was to arrive at a deeper understanding of complex (mostly nonlinear) financial models and to develop effective and robust numerical schemes for solving linear and nonlinear problems arising from the mathematical theory of pricing financial derivatives and related financial products. This was accomplished by means of financial modelling, mathematical analysis and numerical simulations, optimal control techniques and validation of models. In recent years the computational complexity of mathematical models employed in financial mathematics has witnessed tremendous growth. Advanced numerical techniques are now essential to the majority of present-day applications in the financial industry. Special attention is devoted to a uniform methodology for both testing the latest achievements and simultaneously educating young PhD students. Most of the mathematical

codes are linked into a novel computational finance toolbox, which is provided in MATLAB and PYTHON with an open access license. The book offers a valuable guide for researchers in computational finance and related areas, e.g. energy markets, with an interest in industrial mathematics.

Mathematical Finance

Taking continuous-time stochastic processes allowing for jumps as its starting and focal point, this book provides an accessible introduction to the stochastic calculus and control of semimartingales and explains the basic concepts of Mathematical Finance such as arbitrage theory, hedging, valuation principles, portfolio choice, and term structure modelling. It bridges thegap between introductory texts and the advanced literature in the field. Most textbooks on the subject are limited to diffusion-type models which cannot easily account for sudden price movements. Such abrupt changes, however, can often be observed in real markets. At the same time, purely discontinuous processes lead to a much wider variety of flexible and tractable models. This explains why processes with jumps have become an established tool in the statistics and mathematics of finance. Graduate students, researchers as well as practitioners will benefit from this monograph.

Copulae in Mathematical and Quantitative Finance

Copulas are mathematical objects that fully capture the dependence structure among random variables and hence offer great flexibility in building multivariate stochastic models. Since their introduction in the early 1950s, copulas have gained considerable popularity in several fields of applied mathematics, especially finance and insurance. Today, copulas represent a well-recognized tool for market and credit models, aggregation of risks, and portfolio selection. Historically, the Gaussian copula model has been one of the most common models in credit risk. However, the recent financial crisis has underlined its limitations and drawbacks. In fact, despite their simplicity, Gaussian copula models severely underestimate the risk of the occurrence of joint extreme events. Recent theoretical investigations have put new tools for detecting and estimating dependence and risk (like tail dependence, time-varying models, etc) in the spotlight. All such investigations need to be further developed and promoted, a goal this book pursues. The book includes surveys that provide an up-to-date account of essential aspects of copula models in quantitative finance, as well as the extended versions of talks selected from papers presented at the workshop in Cracow.

Matlab für Dummies

Ob Naturwissenschaftler, Mathematiker, Ingenieur oder Datenwissenschaftler - mit MATLAB haben Sie ein mächtiges Tool in der Hand, das Ihnen die Arbeit mit Ihren Daten erleichtert. Aber wie das mit manch mächtigen Dingen so ist - es ist auch ganz schön kompliziert. Aber keine Sorge! Jim Sizemore führt Sie in diesem Buch Schritt für Schritt an das Programm heran - von der Installation und den ersten Skripten bis hin zu aufwändigen Berechnungen, der Erstellung von Grafiken und effizienter Fehlerbehebung. Sie werden begeistert sein, was Sie mit MATLAB alles anstellen können.

A First Course in Quantitative Finance

This new and exciting book offers a fresh approach to quantitative finance and utilises novel features, including stereoscopic images which permit 3D visualisation of complex subjects without the need for additional tools. Offering an integrated approach to the subject, A First Course in Quantitative Finance introduces students to the architecture of complete financial markets before exploring the concepts and models of modern portfolio theory, derivative pricing and fixed income products in both complete and incomplete market settings. Subjects are organised throughout in a way that encourages a gradual and parallel learning process of both the economic concepts and their mathematical descriptions, framed by additional perspectives from classical utility theory, financial economics and behavioural finance. Suitable for postgraduate students studying courses in quantitative finance, financial engineering and financial econometrics as part of an economics, finance, econometric or mathematics program, this book contains all

necessary theoretical and mathematical concepts and numerical methods, as well as the necessary programming code for porting algorithms onto a computer.

Paul Wilmott on Quantitative Finance

Paul Wilmott on Quantitative Finance, Second Edition provides a thoroughly updated look at derivatives and financial engineering, published in three volumes with additional CD-ROM. Volume 1: Mathematical and Financial Foundations; Basic Theory of Derivatives; Risk and Return. The reader is introduced to the fundamental mathematical tools and financial concepts needed to understand quantitative finance, portfolio management and derivatives. Parallels are drawn between the respectable world of investing and the not-so-respectable world of gambling. Volume 2: Exotic Contracts and Path Dependency; Fixed Income Modeling and Derivatives; Credit Risk In this volume the reader sees further applications of stochastic mathematics to new financial problems and different markets. Volume 3: Advanced Topics; Numerical Methods and Programs. In this volume the reader enters territory rarely seen in textbooks, the cutting-edge research. Numerical methods are also introduced so that the models can now all be accurately and quickly solved. Throughout the volumes, the author has included numerous Bloomberg screen dumps to illustrate in real terms the points he raises, together with essential Visual Basic code, spreadsheet explanations of the models, the reproduction of term sheets and option classification tables. In addition to the practical orientation of the book the author himself also appears throughout the book—in cartoon form, readers will be relieved to hear—to personally highlight and explain the key sections and issues discussed. Note: CD-ROM/DVD and other supplementary materials are not included as part of eBook file.

Recent Developments in Computational Finance

Computational finance is an interdisciplinary field which joins financial mathematics, stochastics, numerics and scientific computing. Its task is to estimate as accurately and efficiently as possible the risks that financial instruments generate. This volume consists of a series of cutting-edge surveys of recent developments in the field written by leading international experts. These make the subject accessible to a wide readership in academia and financial businesses. The book consists of 13 chapters divided into 3 parts: foundations, algorithms and applications. Besides surveys of existing results, the book contains many new previously unpublished results.

Computational Finance and Its Applications III

Featuring papers from the Third International Conference on Computational Finance and its Applications, the text includes papers that encompass a wide range of topics such as modern financial services technologies, derivatives pricing, portfolio management and asset allocation, and intelligent trading agents.

Genetic Algorithms and Genetic Programming in Computational Finance

After a decade of development, genetic algorithms and genetic programming have become a widely accepted toolkit for computational finance. Genetic Algorithms and Genetic Programming in Computational Finance is a pioneering volume devoted entirely to a systematic and comprehensive review of this subject. Chapters cover various areas of computational finance, including financial forecasting, trading strategies development, cash flow management, option pricing, portfolio management, volatility modeling, arbitraging, and agent-based simulations of artificial stock markets. Two tutorial chapters are also included to help readers quickly grasp the essence of these tools. Finally, a menu-driven software program, Simple GP, accompanies the volume, which will enable readers without a strong programming background to gain hands-on experience in dealing with much of the technical material introduced in this work.

The Oxford Handbook of Computational Economics and Finance

The Oxford Handbook of Computational Economics and Finance provides a survey of both the foundations of and recent advances in the frontiers of analysis and action. It is both historically and interdisciplinarily rich and also tightly connected to the rise of digital society. It begins with the conventional view of computational economics, including recent algorithmic development in computing rational expectations, volatility, and general equilibrium. It then moves from traditional computing in economics and finance to recent developments in natural computing, including applications of nature-inspired intelligence, genetic programming, swarm intelligence, and fuzzy logic. Also examined are recent developments of network and agent-based computing in economics. How these approaches are applied is examined in chapters on such subjects as trading robots and automated markets. The last part deals with the epistemology of simulation in its trinity form with the integration of simulation, computation, and dynamics. Distinctive is the focus on natural computationalism and the examination of the implications of intelligent machines for the future of computational economics and finance. Not merely individual robots, but whole integrated systems are extending their \"immigration\" to the world of Homo sapiens, or symbiogenesis.