Derivatives Analytics With Python Data Analysis Models Simulation Calibration And Hedging The Wiley Finance Series

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Python for Algorithmic Trading - Yves Hilpisch 2020-11-12

Algorithmic trading, once the exclusive domain of institutional players, is now open to small organizations and individual traders using online platforms. The tool of choice for many traders today is Python and its ecosystem of powerful packages. In this practical book, author Yves Hilpisch shows students, academics, and practitioners how to use Python in the fascinating field of algorithmic trading. You'll learn several ways to apply Python to different aspects of algorithmic trading, such as backtesting trading strategies and interacting with online trading platforms. Some of the biggest buy- and sell-side institutions make heavy use of Python. By exploring options for systematically building and deploying automated algorithmic trading strategies, this book will help you level the playing field. Set up a proper Python environment for algorithmic trading Learn how to retrieve financial data from public and proprietary data sources Explore vectorization for financial analytics with NumPy and pandas Master vectorized backtesting of different algorithmic trading strategies Generate market predictions by using machine learning and deep learning Tackle real-time processing of streaming data with socket programming tools Implement automated algorithmic trading strategies with the OANDA and FXCM trading platforms

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Modern Computational Finance - Antoine Savine 2018-11-13

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.

Introducing Python - Bill Lubanovic 2019-11-06

Easy to understand and fun to read, this updated edition of Introducing Python is ideal for beginning programmers as well as those new to the language. Author Bill Lubanovic takes you from the basics to more involved and varied topics, mixing tutorials with cookbook-style code recipes to explain concepts in Python 3. End-of-chapter exercises help you practice what you've learned. You'll gain a strong foundation in the language, including best practices for testing, debugging, code reuse, and other development tips. This book also shows you how to use Python for applications in business, science, and the arts, using various Python tools and open source packages.

Handbook Of Financial Econometrics, Mathematics, Statistics, And Machine Learning (In 4 Volumes) - Cheng-few Lee 2020-07-30

This four-volume handbook covers important concepts and tools used in the fields of financial econometrics, mathematics, statistics, and machine learning. Econometric methods have been applied in asset pricing, corporate finance, international finance, options and futures, risk management, and in stress testing for financial institutions. This handbook discusses a variety of econometric methods, including single equation multiple regression, simultaneous equation regression, and panel data analysis, among others. It also covers statistical distributions, such as the binomial and log normal distributions, in light of their applications to portfolio theory and asset management in addition to their use in research regarding options and futures contracts.In both theory and methodology, we need to rely upon mathematics, which includes linear algebra, geometry, differential equations, Stochastic differential equation (Ito calculus), optimization, constrained optimization, and others. These forms of mathematics have been used to derive capital market line, security market line (capital asset pricing model), option pricing model, portfolio analysis, and others.In recent times, an increased importance has been given to computer technology in financial research. Different computer languages and programming techniques are important tools for empirical research in finance. Hence, simulation, machine learning, big data, and financial payments are explored in this handbook.Led by Distinguished Professor Cheng Few Lee from Rutgers University, this multi-volume work integrates theoretical, methodological, and practical issues based on his years of academic and industry experience.

Artificial Intelligence in Finance - Yves Hilpisch 2020-10-14

The widespread adoption of AI and machine learning is revolutionizing many industries today. Once these technologies are combined with the programmatic availability of historical and real-time financial data, the financial industry will also change fundamentally. With this practical book, you'll learn how to use AI and machine learning to discover statistical inefficiencies in financial markets and exploit them through algorithmic trading. Author Yves Hilpisch shows practitioners, students, and academics in both finance and data science practical ways to apply machine learning and deep learning algorithms to finance. Thanks to lots of self-contained Python examples, you'll be able to replicate all results and figures presented in the book. In five parts, this guide helps you: Learn central notions and algorithms from AI, including recent breakthroughs on the way to artificial general intelligence (AGI) and superintelligence (SI) Understand why data-driven finance, AI, and machine learning will have a lasting impact on financial theory and practice Apply neural networks and reinforcement learning to discover statistical inefficiencies in financial markets Identify and exploit economic inefficiencies through backtesting and algorithmic trading--the automated execution of trading strategies Understand how AI will influence the competitive dynamics in the financial industry and what the potential emergence of a financial singularity might bring about

Python for Finance - Yves Hilpisch 2018-12-05

The financial industry has recently adopted Python at a tremendous rate, with some of the largest investment banks and hedge funds using it to build core trading and risk management systems. Updated for Python 3, the second edition of this hands-on book helps you get started with the language, guiding developers and quantitative analysts through Python libraries and tools for building financial applications and interactive financial analytics. Using practical examples throughout the book, author Yves Hilpisch also shows you how to develop a full-fledged framework for Monte Carlo simulation-based derivatives and risk analytics, based on a large, realistic case study. Much of the book uses interactive IPython Notebooks.

Financial Risk Modelling and Portfolio Optimization with R - Bernhard Pfaff 2016-08-16

Financial Risk Modelling and Portfolio Optimization with R, 2nd Edition Bernhard Pfaff, Invesco Global Asset Allocation, Germany A must have text for risk modelling and portfolio optimization using R. This book introduces the latest techniques advocated for measuring financial market risk and portfolio optimization, and provides a plethora of R code examples that enable the reader to replicate the results featured throughout the book. This edition has been extensively revised to include new topics on risk surfaces and probabilistic utility optimization as well as an extended introduction to R language. Financial Risk Modelling and Portfolio

Optimization with R: Demonstrates techniques in modelling financial risks and applying portfolio optimization techniques as well as recent advances in the field. Introduces stylized facts, loss function and risk measures, conditional and unconditional modelling of risk; extreme value theory, generalized hyperbolic distribution, volatility modelling and concepts for capturing dependencies. Explores portfolio risk concepts and optimization with risk constraints. Is accompanied by a supporting website featuring examples and case studies in R. Includes updated list of R packages for enabling the reader to replicate the results in the book. Graduate and postgraduate students in finance, economics, risk management as well as practitioners in finance and portfolio optimization will find this book beneficial. It also serves well as an accompanying text in computer-lab classes and is therefore suitable for self-study.

The Price Advantage - Michael V. Marn 2004-02-04

Publisher Description

Python for Finance - Yves Hilpisch 2014-12-11

The financial industry has adopted Python at a tremendous rate recently, with some of the largest investment banks and hedge funds using it to build core trading and risk management systems. This hands-on guide helps both developers and quantitative analysts get started with Python, and guides you through the most important aspects of using Python for quantitative finance. Using practical examples through the book, author Yves Hilpisch also shows you how to develop a full-fledged framework for Monte Carlo simulation-based derivatives and risk analytics, based on a large, realistic case study. Much of the book uses interactive IPython Notebooks, with topics that include: Fundamentals: Python data structures, NumPy array handling, time series analysis with pandas, visualization with matplotlib, high performance I/O operations with PyTables, date/time information handling, and selected best practices Financial topics: mathematical techniques with NumPy, SciPy and SymPy such as regression and optimization; stochastics for Monte Carlo simulation, Value-at-Risk, and Credit-Value-at-Risk calculations; statistics for normality tests, mean-variance portfolio optimization, principal component analysis (PCA), and Bayesian regression Special topics: performance Python for financial algorithms, such as vectorization and parallelization, integrating Python with Excel, and building financial applications based on Web technologies

Listed Volatility and Variance Derivatives - Yves Hilpisch 2016-10-25

Leverage Python for expert-level volatility and variance derivative trading Listed Volatility and Variance Derivatives is a comprehensive treatment of all aspects of these increasingly popular derivatives products, and has the distinction of being both the first to cover European volatility and variance products provided by Eurex and the first to offer Python code for implementing comprehensive quantitative analyses of these financial products. For those who want to get started right away, the book is accompanied by a dedicated Web page and a Github repository that includes all the code from the book for easy replication and use, as well as a hosted version of all the code for immediate execution. Python is fast making inroads into financial modelling and derivatives analytics, and recent developments allow Python to be as fast as pure C++ or C while consisting generally of only 10% of the code lines associated with the compiled languages. This complete guide offers rare insight into the use of Python to undertake complex quantitative analyses of listed volatility and variance derivatives. Learn how to use Python for data and financial analysis, and reproduce stylised facts on volatility and variance markets Gain an understanding of the fundamental techniques of modelling volatility and variance and the model-free replication of variance Familiarise yourself with micro structure elements of the markets for listed volatility and variance derivatives Reproduce all results and graphics with IPython/Jupyter Notebooks and Python codes that accompany the book Listed Volatility and Variance Derivatives is the complete guide to Python-based quantitative analysis of these Eurex derivatives products.

Financial Signal Processing and Machine Learning - Ali N. Akansu 2016-04-20

The modern financial industry has been required to deal with large and diverse portfolios in a variety of asset classes often with limited market data available. Financial Signal Processing and Machine Learning unifies a number of recent advances made in signal processing and machine learning for the design and management of investment portfolios and financial engineering. This book bridges the gap between these disciplines, offering the latest information on key topics including characterizing statistical dependence and correlation in high dimensions, constructing effective and robust risk measures, and their use in portfolio optimization and rebalancing. The book focuses on signal processing approaches to model return, momentum, and mean reversion, addressing theoretical and implementation aspects. It highlights the connections between portfolio theory, sparse learning and compressed sensing, sparse eigen-portfolios, robust optimization, non-Gaussian data-driven risk measures, graphical models, causal analysis through temporal-causal modeling, and large-scale copula-based approaches. Key features: Highlights signal processing and machine learning as key approaches to quantitative finance. Offers advanced mathematical tools for high-dimensional portfolio construction, monitoring, and post-trade analysis problems. Presents portfolio theory, sparse learning and compressed sensing, sparsity methods for investment portfolios. including eigen-portfolios, model return, momentum, mean reversion and non-Gaussian data-driven risk measures with real-world applications of these techniques. Includes contributions from leading researchers and practitioners in both the signal and information processing communities, and the quantitative finance community.

Derivatives Analytics with Python - Yves Hilpisch 2015-08-03

Supercharge options analytics and hedging using the power of Python Derivatives Analytics with Python shows you how to implement market-consistent valuation and hedging approaches using advanced financial models, efficient numerical techniques, and the powerful capabilities of the Python programming language. This unique guide offers detailed explanations of all theory, methods, and processes, giving you the background and tools necessary to value stock index options from a sound foundation. You'll find and use self-contained Python scripts and modules and learn how to apply Python to advanced data and derivatives analytics as you benefit from the 5,000+ lines of code that are provided to help you reproduce the results and graphics presented. Coverage includes market data analysis, risk-neutral valuation, Monte Carlo simulation, model calibration, valuation, and dynamic hedging, with models that exhibit stochastic volatility, jump components, stochastic short rates, and more. The companion website features all code and IPython Notebooks for immediate execution and automation. Python is gaining ground in the derivatives analytics space, allowing institutions to quickly and efficiently deliver portfolio, trading, and risk management results. This book is the finance professional's guide to exploiting Python's capabilities for efficient and performing derivatives analytics. Reproduce major stylized facts of equity and options markets yourself Apply Fourier transform techniques and advanced Monte Carlo pricing Calibrate advanced option pricing models to market data Integrate advanced models and numeric methods to dynamically hedge options Recent developments in the Python ecosystem enable analysts to implement analytics tasks as performing as with C or C++, but using only about one-tenth of the code or even less. Derivatives Analytics with Python — Data Analysis, Models, Simulation, Calibration and Hedging shows you what you need to know to supercharge your derivatives and risk analytics efforts.

Financial Modelling - Joerg Kienitz 2013-02-18

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.

Decision Making under Uncertainty in Financial Markets - Jonas Ekblom 2018-09-13

This thesis addresses the topic of decision making under uncertainty, with particular focus on financial markets. The aim of this research is to support improved decisions in practice, and related to this, to advance our understanding of financial markets. Stochastic optimization provides the tools to determine optimal decisions in uncertain environments, and the optimality conditions of these models produce insights into how financial markets work. To be more concrete, a great deal of financial theory is based on optimality conditions derived from stochastic optimization models. Therefore, an important part of the development of financial theory is to study stochastic optimization models that step-by-step better capture the essence of reality. This is the motivation behind the focus of this thesis, which is to study methods that in relation to prevailing models that underlie financial theory allow additional real-world complexities to be properly modeled. The overall purpose of this thesis is to develop and evaluate stochastic optimization models that support improved decisions under uncertainty on financial markets. The research into stochastic optimization in financial literature has traditionally focused on problem formulations that allow closed-form or `exact' numerical solutions; typically through the application of dynamic programming or optimal control. The focus in this thesis is on two other optimization methods, namely stochastic programming and approximate dynamic programming, which open up opportunities to study new classes of financial problems. More specifically, these optimization methods allow additional and important aspects of many real-world problems to be captured. This thesis contributes with several insights that are relevant for both financial and stochastic optimization literature. First, we show that the modeling of several real-world aspects traditionally not considered in the literature are important components in a model which supports corporate hedging decisions. Specifically, we document the importance of modeling term premia, a rich asset universe and transaction costs. Secondly, we provide two methodological contributions to the stochastic programming literature by: (i) highlighting the challenges of realizing improved decisions through more stages in stochastic programming models; and (ii) developing an importance sampling method that can be used to produce high solution quality with few scenarios. Finally, we design an approximate dynamic programming model that gives close to optimal solutions to the classic, and thus far unsolved, portfolio choice problem with constant relative risk aversion preferences and transaction costs, given many risky assets and a large number of time periods.

The Volatility Smile - Emanuel Derman 2016-09-06

The Volatility Smile The Black-Scholes-Merton option model was the greatest innovation of 20th century finance, and remains the most widely applied theory in all of finance. Despite this success, the model is fundamentally at odds with the observed behavior of option markets: a graph of implied volatilities against strike will typically display a curve or skew, which practitioners refer to as the smile, and which the model cannot explain. Option valuation is not a solved problem, and the past forty years have witnessed an abundance of new models that try to reconcile theory with markets. The Volatility Smile presents a unified treatment of the Black-Scholes-Merton model and the more advanced models that have replaced it. It is also a book about the principles of financial valuation and how to apply them. Celebrated author and quant Emanuel Derman and Michael B. Miller explain not just the mathematics but the ideas behind the models. By examining the foundations, the implementation, and the pros and cons of various models, and by carefully exploring their derivations and their assumptions, readers will learn not only how to handle the volatility smile but how to evaluate and build their own financial models. Topics covered include: The principles of valuation Static and dynamic replication The Black-Scholes-Merton model Hedging strategies Transaction costs The behavior of the volatility smile Implied distributions Local volatility models Stochastic volatility models Jump-diffusion models The first half of the book, Chapters 1 through 13, can serve as a standalone textbook for a course on option valuation and the Black-Scholes-Merton model, presenting the principles of financial modeling, several derivations of the model, and a detailed discussion of how it is used in practice. The second half focuses on the behavior of the volatility smile, and, in conjunction with the first half, can be used for as the basis for a more advanced course.

Algorithmic Trading and Quantitative Strategies - Raja Velu 2020-08-12

Algorithmic Trading and Quantitative Strategies provides an in-depth overview of this growing field with a unique mix of quantitative rigor and practitioner's hands-on experience. The focus on empirical modeling and practical know-how makes this book a valuable resource for students and professionals. The book starts with the often overlooked context of why and how we trade via a detailed introduction to market structure and quantitative microstructure models. The authors then present the necessary quantitative toolbox including more advanced machine learning models needed to successfully operate in the field. They next discuss the subject of quantitative trading, alpha generation, active portfolio management and more recent topics like news and sentiment analytics. The last main topic of execution algorithms is covered in detail with emphasis on the state of the field and critical topics including the elusive concept of market impact. The book concludes with a discussion on the technology infrastructure necessary to implement algorithmic strategies in large-scale production settings. A git-hub repository includes data-sets and explanatory/exercise Jupyter notebooks. The exercises involve adding the correct code to solve the particular analysis/problem.

Machine Learning for Ecology and Sustainable Natural Resource Management - Grant Humphries 2018-11-13

Ecologists and natural resource managers are charged with making complex management decisions in the face of a rapidly changing environment resulting from climate change, energy development, urban sprawl, invasive species and globalization. Advances in Geographic Information System (GIS) technology, digitization, online data availability, historic legacy datasets, remote sensors and the ability to collect data on animal movements via satellite and GPS have given rise to large, highly complex datasets. These datasets could be utilized for making critical management decisions, but are often "messy" and difficult to interpret. Basic artificial intelligence algorithms (i.e., machine learning) are powerful tools that are shaping the world and must be taken advantage of in the life sciences. In ecology, machine learning algorithms are critical to helping resource managers synthesize information to better understand complex ecological systems. Machine Learning has a wide variety of powerful applications, with three general uses that are of particular interest to ecologists: (1) data exploration to gain system knowledge and generate new hypotheses, (2) predicting ecological patterns in space and time, and (3) pattern recognition for ecological sampling. Machine learning can be used to make predictive assessments even when relationships between variables are poorly understood. When traditional techniques fail to capture the relationship between variables, effective use of machine learning can unearth and capture previously unattainable insights into an ecosystem's complexity. Currently, many ecologists do not utilize machine learning as a part of the scientific process. This volume highlights how machine learning techniques can complement the traditional methodologies currently applied in this field.

Listed Volatility and Variance Derivatives - Yves Hilpisch 2016-11-10

Leverage Python for expert-level volatility and variance derivative trading Listed Volatility and Variance Derivatives is a comprehensive treatment of all aspects of these increasingly popular derivatives products, and has the distinction of being both the first to cover European volatility and variance products provided by Eurex and the first to offer Python code for implementing comprehensive quantitative analyses of these financial products. For those who want to get started right away, the book is accompanied by a dedicated Web page and a Github repository that includes all the code from the book for easy replication and use, as well as a hosted version of all the code for immediate execution. Python is fast making inroads into financial modelling and derivatives analytics, and recent developments allow Python to be as fast as pure C++ or C while consisting generally of only 10% of the code lines associated with the compiled languages. This complete guide offers rare insight into the use of Python to undertake complex quantitative analyses of listed volatility and variance derivatives. Learn how to use Python for data and financial analysis, and reproduce stylised facts on volatility and variance markets Gain an understanding of the fundamental techniques of modelling volatility and variance and the model-free replication of variance Familiarise yourself with micro structure elements of the markets for listed volatility and variance derivatives Reproduce all results and graphics with IPython/Jupyter Notebooks and Python codes that accompany the book Listed Volatility and Variance Derivatives is the complete guide to Python-based quantitative analysis of these Eurex derivatives products.

Quantitative Finance For Dummies - Steve Bell 2016-06-07

An accessible, thorough introduction to quantitative finance Does the complex world of quantitative finance make you quiver?You're not alone! It's a tough subject for even high-levelfinancial gurus to grasp, but Quantitative Finance ForDummies offers plain-English guidance on making sense ofapplying mathematics to investing decisions. With this completeguide, you'll gain a solid understanding of futures, options andrisk, and get up-to-speed on the most popular equations, methods,formulas and models (such as the Black-Scholes model) that areapplied in quantitative finance. Also known as mathematical finance, quantitative finance is thefield of mathematics applied to financial markets. It's a highlytechnical discipline—but almost all investment companies andhedge funds use quantitative methods. This fun and friendly guidebreaks the subject of quantitative finance down to easilydigestible parts, making it approachable for personal investors andfinance students alike. With the help of Quantitative FinanceFor Dummies, you'll learn the mathematical skills necessary forsuccess with quantitative finance, the most up-to-date portfolioand risk management applications and everything you need to knowabout basic derivatives pricing. Covers the core models, formulas and methods used inquantitative finance Includes examples and brief exercises to help augment yourunderstanding of QF Provides an easy-to-follow introduction to the complex world ofquantitative finance Explains how QF methods are used to define the current marketvalue of a derivative security Whether you're an aspiring quant or a top-tier personalinvestor, Quantitative Finance For Dummies is your go-toguide for coming to grips with QF/risk management.

Computational Methods for Risk Management in Economics and Finance - Marina Resta 2020-04-02

At present, computational methods have received considerable attention in economics and finance as an alternative to conventional analytical and numerical paradigms. This Special Issue brings together both theoretical and application-oriented contributions, with a focus on the use of computational techniques in finance and economics. Examined topics span on issues at the center of the literature debate, with an eye not only on technical and theoretical aspects but also very practical cases.

Expected Returns - Antti Ilmanen 2011-04-20

This comprehensive reference delivers a toolkit for harvesting market rewards from a wide range of investments. Written by a world-renowned industry expert, the reference discusses how to forecast returns under different parameters. Expected returns of major asset classes, investment strategies, and the effects of underlying risk factors such as growth, inflation, liquidity, and different risk perspectives, are also explained. Judging expected returns requires balancing historical returns with both theoretical considerations and current market conditions. Expected Returns provides extensive empirical evidence, surveys of risk-based and behavioral theories, and practical insights.

Statistics and Data Analysis for Financial Engineering - David Ruppert 2015-04-21

The new edition of this influential textbook, geared towards graduate or advanced undergraduate students, teaches the statistics necessary for financial engineering. In doing so, it illustrates concepts using financial markets and economic data, R Labs with real-data exercises, and graphical and analytic methods for modeling and diagnosing modeling errors. These methods are critical because financial engineers now have access to enormous quantities of data. To make use of this data, the powerful methods in this book for working with quantitative information, particularly about volatility and risks, are essential. Strengths of this fully-revised edition include major additions to the R code and the advanced topics covered. Individual chapters cover, among other topics, multivariate distributions, copulas, Bayesian computations, risk management, and cointegration. Suggested prerequisites are basic knowledge of statistics and probability, matrices and linear algebra, and calculus. There is an appendix on probability, statistics and linear algebra. Practicing financial engineers will also find this book of interest.

The Handbook of News Analytics in Finance - Gautam Mitra 2011-07-13

The Handbook of News Analytics in Finance is a landmarkpublication bringing together the latest models and applications ofNews Analytics for asset pricing, portfolio construction, tradingand risk control. The content of the Hand Book is organised to provide arapid yet comprehensive understanding of this topic. Chapter 1 setsout an overview of News Analytics (NA) with an explanation of thetechnology and applications. The rest of the chapters are presentedin four parts. Part 1 contains an explanation of methods and modelswhich are used to measure and quantify news sentiment. In Part 2the relationship between news events and discovery of abnormalreturns (the elusive alpha) is discussed in detail by the leadingresearchers and industry experts. The material in this part alsocovers potential application of NA to trading and fund management.Part 3 covers the use of quantified news for the purpose ofmonitoring, early diagnostics and risk control. Part 4 is entirelyindustry focused; it contains insights of experts from leadingtechnology (content) vendors. It also contains a discussion oftechnologies and finally a compact directory of content vendor andfinancial analytics companies in the marketplace of NA. Thebook draws equally upon the expertise of academics andpractitioners who have developed these models and is supported bytwo major content vendors - RavenPack and Thomson Reuters - leadingproviders of news analytics software and machine readablenews. The book will appeal to decision makers in the banking, finance andinsurance services industry. In particular: asset managers;quantitative fund managers; hedge fund managers; algorithmictraders; proprietary (program) trading desks; sell-side firms;brokerage houses; risk managers and research departments willbenefit from the unique insights into this new and pertinent areaof financial modelling.

Derivatives Analytics with Python - Yves Hilpisch 2015-06-15

Supercharge options analytics and hedging using the power of Python Derivatives Analytics with Python shows you how to implement market-consistent valuation and hedging approaches using advanced financial models, efficient numerical techniques, and the powerful capabilities of the Python programming language. This unique guide offers detailed explanations of all theory, methods, and processes, giving you the background and tools necessary to value stock index options from a sound foundation. You'll find and use self-contained Python scripts and modules and learn how to apply Python to advanced data and derivatives analytics as you benefit from the 5,000+ lines of code that are provided to help you reproduce the results and graphics presented. Coverage includes market data analysis, risk-neutral valuation, Monte Carlo simulation, model calibration, valuation, and dynamic hedging, with models that exhibit stochastic volatility, jump components, stochastic short rates, and more. The companion website features all code and IPython Notebooks for immediate execution and automation. Python is gaining ground in the derivatives analytics space, allowing institutions to quickly and efficiently deliver portfolio, trading, and risk management results. This book is the finance professional's guide to exploiting Python's capabilities for efficient and performing derivatives analytics. Reproduce major stylized facts of equity and options markets yourself Apply Fourier transform techniques and advanced Monte Carlo pricing Calibrate advanced option pricing models to market data Integrate advanced models and numeric methods to dynamically hedge options Recent developments in the Python ecosystem enable analysts to implement analytics tasks as performing as with C or C++, but using only about one-tenth of the code or even less. Derivatives Analytics with Python — Data Analysis, Models, Simulation, Calibration and Hedging shows you what you need to know to supercharge your derivatives and risk analytics efforts.

Optimization-Based Models for Measuring and Hedging Risk in Fixed Income Markets - Johan Hagenbjörk 2019-12-09

The global fixed income market is an enormous financial market whose value by far exceeds that of the public stock markets. The interbank market consists of interest rate derivatives, whose primary purpose is to manage interest rate risk. The credit market primarily consists of the bond market, which links investors to companies, institutions, and governments with borrowing needs. This dissertation takes an optimization perspective upon modeling both these areas of the fixed-income market. Legislators on the national markets require financial actors to value their financial assets in accordance with market prices. Thus, prices of many assets, which are not publicly traded, must be determined mathematically. The financial quantities needed for pricing are not directly observable but must be measured through solving inverse optimization problems. These measurements are based on the available market prices, which are observed with various degrees of measurement noise. For the interbank market, the relevant financial quantities consist of term structures of interest rates, which are curves displaying the market rates for different maturities. For the bond market, credit risk is an additional factor that can be modeled through default intensity curves and term structures of recovery rates in case of default. By formulating suitable optimization models, the different underlying financial quantities can be measured in accordance with observable market prices, while conditions for economic realism are imposed. Measuring and managing risk is closely connected to the measurement of the underlying financial quantities. Through a data-driven method, we can show that six systematic risk factors can be used to explain almost all variance in the interest rate curves. By modeling the dynamics of these six risk factors, possible outcomes can be simulated in the form of term structure scenarios. For short-term simulation horizons, this results in a representation of the portfolio value distribution that is consistent with the realized outcomes from historically observed term structures. This enables more accurate measurements of interest rate risk, where our proposed method exhibits both lower risk and lower pricing errors compared to traditional models. We propose a method for decomposing changes in portfolio values for an arbitrary portfolio into the risk factors that affect the value of each instrument. By demonstrating the method for the six systematic risk factors identified for the interbank market, we show that almost all changes in portfolio value and portfolio variance can be attributed to these risk factors. Additional risk factors and approximation errors are gathered into two terms, which can be studied to ensure the quality of the performance attribution, and possibly improve it. To eliminate undesired risk within trading books, banks use hedging. Traditional methods do not take transaction costs into account. We, therefore, propose a method for managing the risks in the interbank market through a stochastic optimization model that considers transaction costs. This method is based on a scenario approximation of the optimization problem where the six systematic risk factors are simulated, and the portfolio variance is weighted against the transaction costs. This results in a method that is preferred over the traditional methods for all risk-averse investors. For the credit market, we use data from the bond market in combination with the interbank market to make accurate measurements of the financial quantities. We address the notoriously difficult problem of separating default risk from recovery risk. In addition to the previous identified six systematic risk factors for risk-free interests, we identify four risk factors that explain almost all variance in default intensities, while a single risk factor seems sufficient to model the recovery risk. Overall, this is a higher number of risk factors than is usually found in the literature. Through a simple model, we can measure the variance in bond prices in terms of these systematic risk factors, and through performance attribution, we relate these values to the empirically realized variances from the quoted bond prices. De globala ränte- och kreditmarknaderna är enorma finansiella marknader vars sammanlagda värden vida överstiger de publika aktiemarknadernas. Räntemarknaden består av räntederivat vars främsta användningsområde är hantering av ränterisker. Kreditmarknaden utgörs i första hand av obligationsmarknaden som syftar till att förmedla pengar från investerare till företag, institutioner och stater med upplåningsbehov. Denna avhandling fokuserar på att utifrån ett optimeringsperspektiv modellera både ränte- och obligationsmarknaden. Lagstiftarna på de nationella marknaderna kräver att de finansiella aktörerna värderar sina finansiella tillgångar i enlighet med marknadspriser. Därmed måste priserna på många instrument, som inte handlas publikt, beräknas matematiskt. De finansiella storheter som krävs för denna prissättning är inte direkt observerbara, utan måste mätas genom att lösa inversa optimeringsproblem. Dessa mätningar görs utifrån tillgängliga marknadspriser, som observeras med varierande grad av mätbrus. För räntemarknaden utgörs de relevanta finansiella storheterna av räntekurvor som åskådliggör marknadsräntorna för olika löptider. För obligationsmarknaden utgör kreditrisken en ytterligare faktor som modelleras via fallissemangsintensitetskurvor och kurvor kopplade till förväntat återvunnet kapital vid eventuellt fallissemang. Genom att formulera lämpliga optimeringsmodeller kan de olika underliggande finansiella storheterna mätas i enlighet med observerbara marknadspriser samtidigt som ekonomisk realism eftersträvas. Mätning och hantering av risker är nära kopplat till mätningen av de underliggande finansiella storheterna. Genom en datadriven metod kan vi visa att sex systematiska riskfaktorer kan användas för att förklara nästan all varians i räntekurvorna. Genom att modellera dynamiken i dessa sex riskfaktorer kan tänkbara utfall för räntekurvor simuleras. För kortsiktiga simuleringshorisonter resulterar detta i en representation av fördelningen av portföljvärden som väl överensstämmer med de realiserade utfallen från historiskt observerade räntekurvor. Detta möjliggör noggrannare mätningar av ränterisk där vår föreslagna metod uppvisar såväl lägre risk som mindre prissättningsfel jämfört med traditionella modeller. Vi föreslår en metod för att dekomponera portföljutvecklingen för en godtycklig portfölj till de riskfaktorer som påverkar värdet för respektive instrument. Genom att demonstrera metoden för de sex systematiska riskfaktorerna som identifierats för räntemarknaden visar vi att nästan all portföljutveckling och portföljvarians kan härledas till dessa riskfaktorer. Övriga riskfaktorer och approximationsfel samlas i två termer, vilka kan användas för att säkerställa och eventuellt förbättra kvaliteten i prestationshärledningen. För att eliminera oönskad risk i sina tradingböcker använder banker sig av hedging. Traditionella metoder tar ingen hänsyn till transaktionskostnader. Vi föreslår därför en metod för att hantera riskerna på räntemarknaden genom en stokastisk optimeringsmodell som också tar hänsyn till transaktionskostnader. Denna metod bygger på en scenarioapproximation av optimeringsproblemet där de sex systematiska riskfaktorerna simuleras och portföljvariansen vägs mot transaktionskostnaderna. Detta resulterar i en metod som, för alla riskaverta investerare, är att föredra framför de traditionella metoderna. På kreditmarknaden använder vi data från obligationsmarknaden i kombination räntemarknaden för att göra noggranna mätningar av de finansiella storheterna. Vi angriper det erkänt svåra problemet att separera fallissemangsrisk från återvinningsrisk. Förutom de tidigare sex systematiska riskfaktorerna för riskfri ränta, identifierar vi fyra riskfaktorer som förklarar nästan all varians i fallissemangsintensiteter, medan en enda riskfaktor tycks räcka för att modellera återvinningsrisken. Sammanlagt är detta ett större antal riskfaktorer än vad som brukar användas i litteraturen. Via en enkel modell kan vi mäta variansen i obligationspriser i termer av dessa systematiska riskfaktorer och genom prestationshärledningen relatera dessa värden till de empiriskt realiserade varianserna från kvoterade obligationspriser.

The Quants - Scott Patterson 2010-02-02

With the immediacy of today's NASDAQ close and the timeless power of a Greek tragedy, The Quants is at once a masterpiece of explanatory journalism, a gripping tale of ambition and hubris, and an ominous warning about Wall Street's future. In March of 2006, four of the world's richest men sipped champagne in an opulent New York hotel. They were preparing to compete in a poker tournament with million-dollar stakes, but those numbers meant nothing to them. They were accustomed to risking billions. On that night, these four men and their cohorts were the new kings of Wall Street. Muller, Griffin, Asness, and Weinstein were among the best and brightest of a new breed, the quants. Over the prior twenty years, this species of math whiz--technocrats who make billions not with gut calls or fundamental analysis but with formulas and high-speed computers--had usurped the testosterone-fueled, kill-or-be-killed risk-takers who'd long been the alpha males the world's largest casino. The quants helped create a digitized money-trading machine that could shift billions around the globe with the click of a mouse. Few realized, though, that in creating this unprecedented machine, men like Muller, Griffin, Asness and Weinstein had sowed the seeds for history's greatest financial disaster. Drawing on unprecedented access to these four number-crunching titans, The Quants tells the inside story of what they thought and felt in the days and weeks when they helplessly watched much of their net worth vaporize--and wondered just how their mind-bending formulas and genius-level IQ's had led them so wrong, so fast.

Financial Simulation Modeling in Excel - Keith A. Allman 2011-09-02

"I've worked with simulation in business for over 20 years, andAllman really nails it with this book. I admit that I own hisprevious book on structured finance cash flows, but I was surprisedby what I found in here. He addresses the fundamental questions ofhow decision makers react to simulations and his read was very muchin accordance with what I've experienced myself. When it came tothe nuts and bolts of describing the different types of simulationanalysis the book becomes incredibly detailed. There is workingcode and models for a fantastic array of the most common simulationproblems. If you're so inclined, the book very carefully stepsthrough the tricky math needed to really understand the theorybehind stochastic modeling in finance. If you're preparing modelsthat include any kind of randomization or stochastic modelingcomponent, this book is a must-read, a tremendous value andtime-saver." — David Brode of The Brode Group A practical guide to understanding and implementing financialsimulation modeling As simulation techniques become more popular among the financialcommunity and a variety of sub-industries, a thorough understandingof theory and implementation is critical for practitioners involvedin portfolio management, risk management, pricing, and capitalbudgeting. Financial Simulation Modeling in Excel containsthe information you need to make the most informed decisionspossible in your professional endeavors. Financial Simulation Modeling in Excel contains apractical, hands-on approach to learning complex financialsimulation methodologies using Excel and VBA as a medium. Craftedin an easy to understand format, this book is suitable for anyonewith a basic understanding of finance and Excel. Filled within-depth insights and expert advice, each chapter takes you throughthe theory behind a simulation topic and the implementation of thatsame topic in Excel/VBA in a step-by-step manner. Organized in an easy-to-follow fashion, this guide effectivelywalks you through the process of creating and implementing riskmodels in Excel A companion website contains all the Excel models risk expertsand quantitative analysts need to practice and confirm theirresults as they progress Keith Allman is the author of other successful modeling books,including Corporate Valuation Modeling and ModelingStructured Finance Cash Flows with Microsoft Excel Created for those with some background in finance and experiencein Excel, this reliable resource shows you how to effectivelyperform sound financial simulation modeling, even if you've yet todo extensive modeling up to this point in your professional oracademic career.

Financial Theory with Python - Yves Hilpisch 2021-11-30

Nowadays, finance, mathematics, and programming are intrinsically linked. Financial Theory with Python provides relevant foundations of each discipline to give you the major tools you need to get started in the world of computational finance. Using an approach where mathematical concepts provide the common background against which financial ideas and programming techniques are learned, Financial Theory with Python teaches you the basics of financial economics. Written by the bestselling author of Python for Finance, Yves Hilpisch, this practical guide explains financial, mathematical, and Python programming concepts in an integrative manner so that the interdisciplinary concepts reinforce each other. Draw upon mathematics to learn the foundations of financial theory and Python programming Learn about financial theory, financial data modeling, and the use of Python for computational finance Leverage simple economic models to better understand basic notions of finance and Python programming concepts Utilize both static and dynamic financial modeling to address fundamental problems in finance, such as pricing, decision making, equilibrium, and asset allocation Learn the basics of Python packages useful for financial modeling, such as NumPy, pandas, matplotlib, and SymPy Financial Theory with Python is made available to OÃ??Ã?Â¢??Reilly members in this early release format before itÃ??Ã?Â¢??s available to the general public.

Handbook of Hedge Funds - François-Serge Lhabitant 2011-03-23

A comprehensive guide to the burgeoning hedge fund industry Intended as a comprehensive reference for investors and fund and portfolio managers, Handbook of Hedge Funds combines new material with updated information from Francois-Serge L'habitant's two other successful hedge fund books. This book features up-to-date regulatory and historical information, new case studies and trade examples, detailed analyses of investment strategies, discussions of hedge fund indices and databases, and tips on portfolio construction. Francois-Serge L'habitant (Geneva, Switzerland) is the Head of Investment Research at Kedge Capital. He is Professor of Finance at the University of Lausanne and at EDHEC Business School, as well as the author of five books, including Hedge Funds: Quantitative Insights (0-470-85667-X) and Hedge Funds: Myths & Limits (0-470-84477-9), both from Wiley.

Climate Smart Agriculture - Leslie Lipper 2017-10-20

This book is open access under a CC BY-NC-SA 3.0 IGO license. The book uses an economic lens to identify the main features of climate-smart agriculture (CSA), its likely impact, and the challenges associated with its implementation. Drawing upon theory and concepts from agricultural development, institutional, and resource economics, this book expands and formalizes the conceptual foundations of CSA. Focusing on the adaptation/resilience dimension of CSA, the text embraces a mixture of conceptual analyses, including theory, empirical and policy analysis, and case studies, to look at adaptation and resilience through three possible avenues: ex-ante reduction of vulnerability, increasing adaptive capacity, and ex-post risk coping. The book is divided into three sections. The first section provides conceptual framing, giving an overview of the CSA concept and grounding it in core economic principles. The second section is devoted to a set of case studies illustrating the economic basis of CSA in terms of reducing vulnerability, increasing adaptive capacity and ex-post risk coping. The final section addresses policy issues related to climate change. Providing information on this new and important field in an approachable way, this book helps make sense of CSA and fills intellectual and policy gaps by defining the concept and placing it within an economic decision-making framework. This book will be of interest to agricultural, environmental, and natural resource economists, development economists, and scholars of development studies, climate change, and agriculture. It will also appeal to policy-makers, development practitioners, and members of governmental and non-governmental organizations interested in agriculture, food security and climate change.

How I Became a Quant - Richard R. Lindsey 2011-01-11

Praise for How I Became a Quant "Led by two top-notch quants, Richard R. Lindsey and Barry Schachter, How I Became a Quant details the quirky world of quantitative analysis through stories told by some of today's most successful quants. For anyone who might have thought otherwise, there are engaging personalities behind all that number crunching!" --Ira Kawaller, Kawaller & Co. and the Kawaller Fund "A fun and fascinating read. This book tells the story of how academics, physicists, mathematicians, and other scientists became professional investors managing billions." --David A. Krell, President and CEO, International Securities Exchange "How I Became a Quant should be must reading for all students with a quantitative aptitude. It provides fascinating examples of the dynamic career opportunities potentially open to anyone with the skills and passion for quantitative analysis." --Roy D. Henriksson, Chief Investment Officer, Advanced Portfolio Management "Quants"--those who design and implement mathematical models for the pricing of derivatives, assessment of risk, or prediction of market movements--are the backbone of today's investment industry. As the greater volatility of current financial markets has driven investors to seek shelter from increasing uncertainty, the quant revolution has given people the opportunity to avoid unwanted financial risk by literally trading it away, or more specifically, paying someone else to take on the unwanted risk. How I Became a Quant reveals the faces behind the quant revolution, offering you?the?chance to learn firsthand what it's like to be a?quant today. In this fascinating collection of Wall Street war stories, more than two dozen quants detail their roots, roles, and contributions, explaining what they do and how they do it, as well as outlining the sometimes unexpected paths they have followed from the halls of academia to the front lines of an investment revolution.

Data Analysis and Related Applications, Volume 1 - Konstantinos N. Zafeiris 2022-11-01

The scientific field of data analysis is constantly expanding due to the rapid growth of the computer industry and the wide applicability of computational and algorithmic techniques, in conjunction with new advances in statistical, stochastic and analytic tools. There is a constant need for new, high-quality publications to cover the recent advances in all fields of science and engineering. This book is a collective work by a number of leading scientists, computer experts, analysts, engineers, mathematicians, probabilists and statisticians who have been working at the forefront of data analysis and related applications. The chapters of this collaborative work represent a cross-section of current concerns, developments and research interests in the above scientific areas. The collected material has been divided into appropriate sections to provide the reader with both theoretical and applied information on data analysis methods, models and techniques, along with related applications.

Derivatives Analytics with Python - Yves Hilpisch 2015-06-15

Supercharge options analytics and hedging using the power ofPython Derivatives Analytics with Python shows you how toimplement market-consistent valuation and hedging approaches usingadvanced financial models, efficient numerical techniques, and thepowerful capabilities of the Python programming language. Thisunique guide offers detailed explanations of all theory, methods,and processes, giving you the background and tools necessary tovalue stock index options from a sound foundation. You'll find anduse self-contained Python scripts and modules and learn how toapply Python to advanced data and derivatives analytics as youbenefit from the 5,000+ lines of code that are provided to help youreproduce the results and graphics presented. Coverage includesmarket data analysis, risk-neutral valuation, Monte Carlosimulation, model calibration, valuation, and dynamic hedging, withmodels that exhibit stochastic volatility, jump components,stochastic short rates, and more. The companion website featuresall code and IPython Notebooks for immediate execution andautomation. Python is gaining ground in the derivatives analytics space,allowing institutions to quickly and efficiently deliver portfolio,trading, and risk management results. This book is the financeprofessional's guide to exploiting Python's capabilities forefficient and performing derivatives analytics. Reproduce major stylized facts of equity and options marketsyourself Apply Fourier transform techniques and advanced Monte Carlopricing Calibrate advanced option pricing models to market data Integrate advanced models and numeric methods to dynamicallyhedge options Recent developments in the Python ecosystem enable analysts toimplement analytics tasks as performing as with C or C++, but usingonly about one-tenth of the code or even less. DerivativesAnalytics with Python — Data Analysis, Models, Simulation,Calibration and Hedging shows you what you need to know tosupercharge your derivatives and risk analytics efforts.

Pairs Trading - Ganapathy Vidyamurthy 2011-02-02

The first in-depth analysis of pairs trading Pairs trading is a market-neutral strategy in its most simple form. The strategy involves being long (or bullish) one asset and short (or bearish) another. If properly performed, the investor will gain if the market rises or falls. Pairs Trading reveals the secrets of this rigorous quantitative analysis program to provide individuals and investment houses with the tools they need to successfully implement and profit from this proven trading methodology. Pairs Trading contains specific and tested formulas for identifying and investing in pairs, and answers important questions such as what ratio should be used to construct the pairs properly. Ganapathy Vidyamurthy (Stamford, CT) is currently a quantitative software analyst and developer at a major New York City hedge fund.

Implementing Models of Financial Derivatives - Nick Webber 2011-09-07

Implementing Models of Financial Derivatives is a comprehensive treatment of advanced implementation techniques in VBA for models of financial derivatives. Aimed at readers who are already familiar with the basics of VBA it emphasizes a fully object oriented approach to valuation applications, chiefly in the context of Monte Carlo simulation but also more broadly for lattice and PDE methods. Its unique approach to valuation, emphasizing effective implementation from both the numerical and the computational perspectives makes it an invaluable resource. The book comes with a library of almost a hundred Excel spreadsheets containing implementations of all the methods and models it investigates, including a large number of useful utility procedures. Exercises structured around four application streams supplement the exposition in each chapter, taking the reader from basic procedural level programming up to high level object oriented implementations. Written in eight parts, parts 1-4 emphasize application design in VBA, focused around the development of a plain Monte Carlo application. Part 5 assesses the performance of VBA for this application, and the final 3 emphasize the implementation of a fast and accurate Monte Carlo method for option valuation. Key topics include: ?Fully polymorphic factories in VBA; ?Polymorphic input and output using the TextStream and FileSystemObject objects; ?Valuing a book of options; ?Detailed assessment of the performance of VBA data structures; ?Theory, implementation, and comparison of the main Monte Carlo variance reduction methods; ?Assessment of discretization methods and their application to option valuation in models like CIR and Heston; ?Fast valuation of Bermudan options by Monte Carlo. Fundamental theory and implementations of lattice and PDE methods are presented in appendices and developed through the book in the exercise streams. Spanning the two worlds of academic theory and industrial practice, this book is not only suitable as a classroom text in VBA, in simulation methods, and as an introduction to object oriented design, it is also a reference for model implementers and quants working alongside derivatives groups. Its implementations are a valuable resource for students, teachers and developers alike. Note: CD-ROM/DVD and other supplementary materials are not included as part of eBook file.

The Money Formula - Paul Wilmott 2017-06-12

Explore the deadly elegance of finance's hidden powerhouse The Money Formula takes you inside the engine room of the global economy to explore the little-understood world of quantitative finance, and show how the future of our economy rests on the backs of this all-but-impenetrable industry. Written not from a post-crisis perspective – but from a preventative point of view – this book traces the development of financial derivatives from bonds to credit default swaps, and shows how mathematical formulas went beyond pricing to expand their use to the point where they dwarfed the real economy. You'll learn how the deadly allure of their ice-cold beauty has misled generations of economists and investors, and how continued reliance on these formulas can either assist future economic development, or send the global economy into the financial equivalent of a cardiac arrest. Rather than rehash tales of post-crisis fallout, this book focuses on preventing the next one. By exploring the heart of the shadow economy, you'll be better prepared to ride the rough waves of finance into the turbulent future. Delve into one of the world's least-understood but highest-impact industries Understand the key principles of quantitative finance and the evolution of the field Learn what quantitative finance has become, and how it affects us all Discover how the industry's next steps dictate the economy's future How do you create a quadrillion dollars out of nothing, blow it away and leave a hole so large that even years of "quantitative easing" can't fill it – and then go back to doing the same thing? Even amidst global recovery, the financial system still has the potential to seize up at any moment. The Money Formula explores the how and why of financial disaster, what must happen to prevent the next one.

The Heston Model and Its Extensions in VBA - Fabrice D. Rouah 2015-03-20

Practical options pricing for better-informed investmentdecisions. The Heston Model and Its Extensions in VBA is thedefinitive guide to options pricing using two of the derivativesindustry's most powerful modeling tools—the Heston model, andVBA. Light on theory, this extremely useful reference focuses onimplementation, and can help investors more efficiently—andaccurately—exploit market information to better informinvestment decisions. Coverage includes a description of the Hestonmodel, with specific emphasis on equity options pricing andvariance modeling, The book focuses not only on the original Hestonmodel, but also on the many enhancements and refinements that havebeen applied to the model, including methods that use the Fouriertransform, numerical integration schemes, simulation, methods forpricing American options, and much more. The companion websiteoffers pricing code in VBA that resides in an extensive set ofExcel spreadsheets. The Heston model is the derivatives industry's most popularstochastic volatility model for pricing equity derivatives. Thisbook provides complete guidance toward the successfulimplementation of this valuable model using the industry'subiquitous financial modeling software, giving users theunderstanding—and VBA code—they need to produce optionprices that are more accurate, and volatility surfaces that moreclosely reflect market conditions. Derivatives pricing is often the hinge on which profit is madeor lost in financial institutions, making accuracy of utmostimportance. This book will help risk managers, traders, portfoliomanagers, quants, academics and other professionals betterunderstand the Heston model and its extensions, in a writing stylethat is clear, concise, transparent and easy to understand. Forbetter pricing accuracy, The Heston Model and Its Extensions inVBA is a crucial resource for producing more accurate modeloutputs such as prices, hedge ratios, volatilities, and graphs.

Machine Learning in Finance - Matthew F. Dixon 2020-07-01

This book introduces machine learning methods in finance. It presents a unified treatment of machine learning and various statistical and computational disciplines in quantitative finance, such as financial econometrics and discrete time stochastic control, with an emphasis on how theory and hypothesis tests inform the choice of algorithm for financial data modeling and decision making. With the trend towards increasing computational resources and larger datasets, machine learning has grown into an important skillset for the finance industry. This book is written for advanced graduate students and academics in financial econometrics, mathematical finance and applied statistics, in addition to quants and data scientists in the field of quantitative finance. Machine Learning in Finance: From Theory to Practice is divided into three parts, each part covering theory and applications. The first presents supervised learning for cross-sectional data from both a Bayesian and frequentist perspective. The more advanced material places a firm emphasis on neural networks, including deep learning, as well as Gaussian processes, with examples in investment management and derivative modeling. The second part presents supervised learning for time series data, arguably the most common data type used in finance with examples in trading, stochastic volatility and fixed income modeling. Finally, the third part presents reinforcement learning and its applications in trading, investment and wealth management. Python code examples are provided to support the readers' understanding of the methodologies and applications. The book also includes more than 80 mathematical and programming exercises, with worked solutions available to instructors. As a bridge to research in this emergent field, the final chapter presents the frontiers of machine learning in finance from a researcher's perspective, highlighting how many well-known concepts in statistical physics are likely to emerge as important methodologies for machine learning in finance.

Python for Finance - Yuxing Yan 2014-04-25

A hands-on guide with easy-to-follow examples to help you learn about option theory, quantitative finance, financial modeling, and time series using Python. Python for Finance is perfect for graduate students, practitioners, and application developers who wish to learn how to utilize Python to handle their financial needs. Basic knowledge of Python will be helpful but knowledge of programming is necessary.