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Interest-Rate Option Models Interest Rate Models - Theory and Practice Interest Rate Models: an Infinite Dimensional Stochastic Analysis Perspective Interest Rate Models Interest Rate Modelling Interest Rate Modeling Interest Rate Modeling: Post-Crisis Challenges and Approaches Interest Rate Modeling Interest Rate Risk Modeling Interest Rate Risk Models Interest Rate Modeling Interest Rate, Term Structure, and Valuation Modeling Modeling Fixed-Income Securities and Interest Rate Options Stochastic Interest Rates Modeling Fixed Income Securities and Interest Rate Options Interest Rate Models Bayesian Survival Analysis Failure Rate Modelling for Reliability and Risk Geochemical Rate Models An Elementary Introduction to Stochastic Interest Rate Modeling Nonlinear Exchange Rate Models Neuronal Dynamics Estimating Parameters of Short-Term Real Interest Rate Models The SABR/LIBOR Market Model Discrete-Time Continuous-State Interest Rate Models Discrete-time Continuous-state Interest Rate Models Interest Rate Models, Asset Allocation and Quantitative Techniques for Central Banks and Sovereign Wealth Funds Consistency Problems for Heath-Jarrow-Morton Interest Rate Models Interest Rate Modelling in the Multi-Curve Framework Interest Rate, Term Structure, and Valuation Modeling An Elementary Introduction to Stochastic Interest Rate Modeling Modern Pricing of Interest-Rate Derivatives Stochastic Interest Rate Modeling With Fixed Income Derivative Pricing (Third Edition) Interest Rate Modelling Interest Rate Modeling An Empirical Comparison of the Short Term Interest Rate Models Short Rate Models with Nonlinear Drift and Jumps Event History Analysis With Stata Exchange Rates in Multicountry Econometric Models Measure, Probability, and Mathematical Finance

This textbook is written as an accessible introduction to interest rate modeling and related derivatives, which have become increasingly important subjects of interest in financial mathematics. The models considered range from standard short rate to forward rate models and include more advanced topics such as the BGM model and an approach to its calibration. An elementary treatment of the pricing of caps and swaptions under forward measures is also provided, with a focus on explicit calculations and a step-by-step introduction of concepts. Each chapter is accompanied with exercises and their complete solutions, making this book suitable for advanced undergraduate or beginning graduate-level students. Containing many results that are new or exist only in recent research articles, Interest Rate Modeling: Theory and Practice portrays the theory of interest rate modeling as a three-dimensional object of finance, mathematics, and computation. It introduces all models with financial-economical justifications, develops options along the martingale app "Overall this book provides an excellent summary of the state of knowledge of term structure modelling. It combines a solid academic background with the practical experience of someone who works in the financial sector." Alan White and John Hull, A-J Financial Systems, Canada The modelling of exotic interest-rate options is such an important and fast-moving area, that the updating of the extremely successful first edition has been eagerly awaited. This edition re-focuses the assessment of various models presented in the first edition, in light of the new developments of modelling imperfect correlation between financial quantities. It also presents a substantial new chapter devoted to this revolutionary modelling method. In this second edition, readers will also find important new data dealing with the securities markets and the probabilistic/stochastic calculus tools. Other changes include: a new chapter on the issues arising in the pricing of several classes of exotic interest-rate instruments; and insights from the BDT and the Brennan and Schwartz approaches which can be combined into a new class of "generalised models". Further details can be found on the links between mean-reversion and calibration for important classes of models. This solid introduction uses the principles of physics and the tools of mathematics to approach fundamental questions of neuroscience. Designed for Master's students, this practical text strikes the right balance between mathematical rigour and real-world application. Bond markets differ in one fundamental aspect from standard stock markets. While the latter are built up to a finite number of trade assets, the underlying basis of a bond market is the entire term structure of interest rates: an infinite-dimensional variable which is not directly observable. On the empirical side, this necessitates curve-fitting methods for the daily estimation of the term structure. Pricing models, on the other hand, are usually built upon stochastic factors representing the term structure in a finite-dimensional state space. Written for readers with knowledge in mathematical finance (in particular interest rate theory) and elementary stochastic analysis, this research monograph has threefold aims: to bring together estimation methods and factor models for interest rates, to provide appropriate consistency conditions and to explore some important examples. Following the financial crisis dramatic market changes, a new standard in interest rate modelling emerged, called the multi-curve framework. The author provides a detailed analysis of the framework, through its foundations, evolution and implementation. The book also covers recent extensions to collateral and stochastic spreads modelling. Modeling Fixed Income Securities and Interest Rate Options, Third Edition presents the basics of fixed-income securities in a way that, unlike competitive texts, requires a minimum of prerequisites. While other books focus heavily on institutional details of the bond market, all of which could easily be learned "on the job," the third edition of this classic textbook is more focused with presenting a coherent theoretical framework for understanding all basic models. The author’s unified approach—the Heath Jarrow Morton model—under which all other models are presented as special cases, enhances understanding of the material. The author’s pricing model is widely used in today’s securities industry. This new edition offers many updates to align with advances in the research and requires a minimum of prerequisites while presenting the basics of fixed-income securities. Highlights of the Third Edition Chapters 1-16 completely updated to align with advances in research Thoroughly eliminates out-of-date material while advancing the presentation Includes an ample amount of exercises and examples throughout the text which illustrate key concepts . • Practical guide for asset-liability managers faced with the decision as to whether to build or buy a financial model • Topics include modeling cash flows, net investment income versus net portfolio value, projections of interest rates, and volatility A guide for asset-liability managers and other investment professionals who are faced with the decision of whether to build or buy a financial model to measure, monitor, and help manage their institution's risk exposure. It reviews the evolution of interest rate risk models and evaluates the state-of-the-art models in use. Includes Modeling cash flows; modeling the term structure; OAS technology; net interest income versus net portfolio value; build versus buy analysis; practical methods for deriving input assumptions; prepayment rates; deposit decay rates; projections of interest rate and volatility. This ultimate guide contains an excellent blend of theory and practice This comprehensive guide covers various aspects of model building for fixed income securities and derivatives. Filled with expert advice, valuable insights, and advanced modeling techniques, Interest Rate, Term Structure, and Valuation Modeling is a book that all institutional investors, portfolio managers, and risk professionals should have. John Wiley & Sons, Inc. is proud to be the publisher of the esteemed Frank J. Fabozzi Series. Comprising nearly 100 titles-which include numerous bestsellers—The Frank J. Fabozzi Series is a key resource for finance professionals and academics, strategists and students, and investors. The series is overseen by its eponymous editor, whose expert instruction and presentation of new ideas have been at the forefront of financial publishing for over twenty years. His successful career has provided him with the knowledge, insight, and advice that has led to this comprehensive series. Frank J. Fabozzi, PhD, CFA, CPA, is Editor of the Journal of Portfolio Management, which is read by thousands of institutional investors, as well as editor or author of over 100 books on finance for the professional and academic markets. Currently, Dr. Fabozzi is an adjunct Professor of Finance at Yale University's School of Management and on the board of directors of the Guardian Life family of funds and the Black Rock complex of funds. This edited volume contains essential readings for financial analysts and market practitioners working at Central Banks and Sovereign Wealth Funds. It presents the reader with state-of-the-art methods that are directly implementable, and industry 'best-practices' as followed by leading institutions in their field. This well-organised, comprehensive reference and textbook describes rate models developed from fundamental kinetic theory and presents models using consistent terminology and notation.

Major topics include rate equations, reactor theory, transition state theory, surface reactivity, advective and diffusive transport, aggregation kinetics, nucleation kinetics and solid-solid transformation rates. The theoretical basis and mathematical derivation of each model is presented in detail and illustrated with worked examples from real-world applications to geochemical problems. The book is also supported by online resources: self-study problems put students' new learning into practice, and spreadsheets provide the full data used in figures and examples, enabling students to manipulate the data for themselves. This is an ideal overview for graduate students, providing a solid understanding of geochemical kinetics. It will also provide researchers and professional geochemists with a valuable reference for solving scientific and engineering problems. "The three volumes of Interest rate modeling are aimed primarily at practitioners working in the area of interest rate derivatives, but much of the material is quite general and, we believe, will also hold significant appeal to researchers working in other asset classes. Students and academics interested in financial engineering and applied work will find the material particularly useful for its description of real-life model usage and for its expansive discussion of model calibration, approximation theory, and numerical methods."--Preface. In recent years, interest-rate modeling has developed rapidly in terms of both practice and theory. The academic and practitioners' communities, however, have not always communicated as productively as would have been desirable. As a result, their research programs have often developed with little constructive interference. In this book, Riccardo Rebonato draws on his academic and professional experience, straddling both sides of the divide to bring together and build on what theory and trading have to offer. Rebonato begins by presenting the conceptual foundations for the application of the LIBOR market model to the pricing of interest-rate derivatives. Next he treats in great detail the calibration of this model to market prices, asking how possible and advisable it is to enforce a simultaneous fitting to several market observables. He does so with an eye not only to mathematical feasibility but also to financial justification, while devoting special scrutiny to the implications of market incompleteness. Much of the book concerns an original extension of the LIBOR market model, devised to account for implied volatility smiles. This is done by introducing a stochastic-volatility, displaced-diffusion version of the model. The emphasis again is on the financial justification and on the computational feasibility of the proposed solution to the smile problem. This book is must reading for quantitative researchers in financial houses, sophisticated practitioners in the derivatives area, and students of finance. Interest rate modeling and the pricing of related derivatives remain subjects of increasing importance in financial mathematics and risk management. This book provides an accessible introduction to these topics by a step-by-step presentation of concepts with a focus on explicit calculations. Each chapter is accompanied with exercises and their complete solutions, making the book suitable for advanced undergraduate and graduate level students. This second edition retains the main features of the first edition while incorporating a complete revision of the text as well as additional exercises with their solutions, and a new introductory chapter on credit risk. The stochastic interest rate models considered range from standard short rate to forward rate models, with a treatment of the pricing of related derivatives such as caps and swaptions under forward measures. Some more advanced topics including the BGM model and an approach to its calibration are also covered. This book presents the mathematical issues that arise in modeling the interest rate term structure by casting the interest-rate models as stochastic evolution equations in infinite dimensions. The text includes a crash course on interest rates, a self-contained introduction to infinite dimensional stochastic analysis, and recent results in interest rate theory. From the reviews: "A wonderful book. The authors present some cutting-edge math." --WWW.RISKBOOK.COM This text seeks to teach the basics of fixed-income securities in a way that requires a minimum of prerequisites. Its approach - the Heath Jarrow Morton model - under which all other models are presented as special cases, aims to enhance understanding while avoiding repetition. Andrew Cairns introduces the tools required for the arbitrage-free modelling of the term structure of interest rates. The text offers a detailed introduction to numerical methods, credit risk & calibration. An introduction to the mathematical theory and financial models developed and used on Wall Street Providing both a theoretical and practical approach to the underlying mathematical theory behind financial models, Measure, Probability, and Mathematical Finance: A Problem-Oriented Approach presents important concepts and results in measure theory, probability theory, stochastic processes, and stochastic calculus. Measure theory is indispensable to the rigorous development of probability theory and is also necessary to properly address martingale measures, the change of numeraire theory, and LIBOR market models. In addition, probability theory is presented to facilitate the development of stochastic processes, including martingales and Brownian motions, while stochastic processes and stochastic calculus are discussed to model asset prices and develop derivative pricing models. The authors promote a problem-solving approach when applying mathematics in real-world situations, and readers are encouraged to address theorems and problems with mathematical rigor. In addition, Measure, Probability, and Mathematical Finance features: A comprehensive list of concepts and theorems from measure theory, probability theory, stochastic processes, and stochastic calculus Over 500 problems with hints and select solutions to reinforce basic concepts and important theorems Classic derivative pricing models in mathematical finance that have been developed and published since the seminal work of Black and Scholes Measure, Probability, and Mathematical Finance: A Problem-Oriented Approach is an ideal textbook for introductory quantitative courses in business, economics, and mathematical finance at the upper-undergraduate and graduate levels. The book is also a useful reference for readers who need to build their mathematical skills in order to better understand the mathematical theory of derivative pricing models. Survival analysis arises in many fields of study including medicine, biology, engineering, public health, epidemiology, and economics. This book provides a comprehensive treatment of Bayesian survival analysis. It presents a balance between theory and applications, and for each class of models discussed, detailed examples and analyses from case studies are presented whenever possible. The applications are all from the health sciences, including cancer, AIDS, and the environment. This book presents a major innovation in the interest rate space. It explains a financially motivated extension of the LIBOR Market model which accurately reproduces the prices for plain vanilla hedging instruments (swaptions and caplets) of all strikes and maturities produced by the SABR model. The authors show how to accurately recover the whole of the SABR smile surface using their extension of the LIBOR market model. This is not just a new model, this is a new way of option pricing that takes into account the need to calibrate as accurately as possible to the plain vanilla reference hedging instruments and the need to obtain prices and hedges in reasonable time whilst reproducing a realistic future evolution of the smile surface. It removes the hard choice between accuracy and time because the framework that the authors provide reproduces today's market prices of plain vanilla options almost exactly and simultaneously gives a reasonable future evolution for the smile surface. The authors take the SABR model as the starting point for their extension of the LMM because it is a good model for European options. The problem, however with SABR is that it treats each European option in isolation and the processes for the various underlyings (forward and swap rates) do not talk to each other so it isn't obvious how to relate these processes into the dynamics of the whole yield curve. With this new model, the authors bring the dynamics of the various forward rates and stochastic volatilities under a single umbrella. To ensure the absence of arbitrage they derive drift adjustments to be applied to both the forward rates and their volatilities. When this is completed, complex derivatives that depend on the joint realisation of all relevant forward rates can now be priced. Contents THE THEORETICAL SET-UP The Libor Market model The SABR Model The LMM-SABR Model IMPLEMENTATION AND CALIBRATION Calibrating the LMM-SABR model to Market Caplet prices Calibrating the LMM/SABR model to Market Swaption Prices Calibrating the Correlation Structure EMPIRICAL EVIDENCE The Empirical problem Estimating the volatility of the forward rates Estimating the correlation structure Estimating the volatility of the volatility HEDGING Hedging the Volatility Structure Hedging the Correlation Structure Hedging in conditions of market stress As interest rate markets continue to innovate and expand it is becoming increasingly important to remain up-to-date with the latest practical and theoretical developments. This book covers the latest developments in full, with descriptions and implementation techniques for all the major classes of interest rate models-both those actively used in practice as well as theoretical models still 'waiting in the wings'. Interest rate models, implementation methods and estimation issues are discussed at length by the authors as are important new developments such as kernel estimation techniques, economic based models, implied pricing methods and models on manifolds. Providing balanced coverage of both the practical use of models and the theory that underlies them, Interest Rate Modelling adopts an implementation orientation throughout, making it an ideal resource for both practitioners and researchers. This ultimate guide contains an excellent blend of theory and practice This comprehensive guide covers various aspects of model building for fixed income securities and derivatives. Filled with expert advice, valuable insights, and advanced modeling techniques, Interest Rate, Term Structure, and Valuation Modeling is a book that all institutional investors, portfolio managers, and risk professionals should have. John

Wiley & Sons, Inc. is proud to be the publisher of the esteemed Frank J. Fabozzi Series. Comprising nearly 100 titles-which include numerous bestsellers—The Frank J. Fabozzi Series is a key resource for finance professionals and academics, strategists and students, and investors. The series is overseen by its eponymous editor, whose expert instruction and presentation of new ideas have been at the forefront of financial publishing for over twenty years. His successful career has provided him with the knowledge, insight, and advice that has led to this comprehensive series. Frank J. Fabozzi, PhD, CFA, CPA, is Editor of the Journal of Portfolio Management, which is read by thousands of institutional investors, as well as editor or author of over 100 books on finance for the professional and academic markets. Currently, Dr. Fabozzi is an adjunct Professor of Finance at Yale University's School of Management and on the board of directors of the Guardian Life family of funds and the Black Rock complex of funds. “Failure Rate Modeling for Reliability and Risk” focuses on reliability theory, and to the failure rate (hazard rate, force of mortality) modeling and its generalizations to systems operating in a random environment and to repairable systems. The failure rate is one of the crucial probabilistic characteristics for a number of disciplines; including reliability, survival analysis, risk analysis and demography. The book presents a systematic study of the failure rate and related indices, and covers a number of important applications where the failure rate plays the major role. Applications in engineering systems are studied, together with some actuarial, biological and demographic examples. The book provides a survey of this broad and interdisciplinary subject which will be invaluable to researchers and advanced students in reliability engineering and applied statistics, as well as to demographers, econometricians, actuaries and many other mathematically oriented researchers. Containing many results that are new, or which exist only in recent research articles, Interest Rate Modeling: Theory and Practice, 2nd Edition portrays the theory of interest rate modeling as a three-dimensional object of finance, mathematics, and computation. It introduces all models with financial-economical justifications, develops options along the martingale approach, and handles option evaluations with precise numerical methods. Features Presents a complete cycle of model construction and applications, showing readers how to build and use models Provides a systematic treatment of intriguing industrial issues, such as volatility and correlation adjustments Contains exercise sets and a number of examples, with many based on real market data Includes comments on cutting-edge research, such as volatility-smile, positive interest-rate models, and convexity adjustment New to the 2nd edition: volatility smile modeling; a new paradigm for inflation derivatives modeling; an extended market model for credit derivatives; a dual-curved model for the post-crisis interest-rate derivatives markets; and an elegant framework for the xVA. Many financial contracts can be regarded as derivative securities where the underlying state variable is one or more rates of interest. A partial list of such contracts would include zero-coupon bonds, coupon paying bonds, callable bonds, convertible bonds, retractable/extendable bonds, etc., along with a number of popular interest rate derivatives such as swaps, swaptions, caps, and floors. A commonly used strategy for valuing these contracts is to base a continuous time model for the stochastic behaviour of the short term rate of interest. Three key features of most of the models currently in use are (i) the drift, or expected change over a short time period in the level of the short term interest rate, is a linear function; (ii) the conditional variance of changes in short term interest rates is not strongly related to the level of interest rates; and (iii) the short term interest rate is assumed to follow a diffusion process, which effectively means that it cannot change too rapidly over short periods of time. Each of these assumptions appears to be made primarily for modeling convenience, as they make it possible in some cases to derive analytical expressions for the values of bonds and European-style bond options. If such solutions are not available, then numerical techniques such as Monte Carlo simulation or the numerical solution of partial differential equations are needed. However, available econometric evidence indicates that all of the assumptions noted above are questionable: changes in short term interest rates may be characterized by drift which is nonlinear and by conditional variance that depends more heavily on the level of interest rates than is assumed in models with analytic solutions. Moreover, they may be better approximated by a jump-diffusion process which allows for sudden discontinuous changes. Consequently, it is of interest to develop numerical techniques to value interest rate derivative securities for cases where the short term interest rate follows a jump-diffusion process featuring non-linear drift. This thesis describes and illustrates the use of such techniques. This article attempts to identify the best model of the short term interest rates that can predict its stochastic process over time.We studied eight different models of interest rates in the short term. The choice of these models was the aim of analyzing the relevance of certain specifications of the stochastic process of the short term interest rates, the effect of mean reversion and the sensitivity of the volatility to the level of interest rate.The yield on three months treasury bills is used as a proxy for the short term interest rates. The parameters of the different stochastic process are estimated using the generalized method of moments. The results show that the effect of mean reversion is not statistically significant and that volatility is highly sensitive to the level of interest rates.To further study the performance prediction of the intertemporal behavior of the short term interest rate of the various models; we simulated their stochastic process for different periods.The results show that none of the studied models reproduce the actual path of the short term interest rates. The problem lies in the parametric specification of the mean and volatility of the diffusion process. This paper sheds light on a narrow but crucial question in finance: What should be the parameters of a model of the short-term real interest rate? Although models for the nominal interest rate are well studied and estimated, dynamics of the real interest rate are rarely explored. Simple ad hoc processes for the short-term real interest rate are usually assumed as building blocks for more sophisticated models. In this paper, parameters of the real interest rate model are estimated in the broad class of single-factor interest rate diffusion processes on U.S. monthly data. It is shown that the elasticity of interest rate volatility—the relationship between the volatility of changes in the interest rate and its level—plays a crucial role in explaining real interest rate dynamics. The empirical estimates of the elasticity of the real interest rate volatility are found to be about 0.5, much lower than that of the nominal interest rate. These estimates show that the square root process, as in the Cox-Ingersoll-Ross model, provides a good characterization of the short-term real interest rate process. The definitive guide to fixed income valuation and risk analysis The Trilogy in Fixed Income Valuation and Risk Analysiscomprehensively covers the most definitive work on interest raterisk, term structure analysis, and credit risk. The first book oninterest rate risk modeling examines virtually every well-known IRRmodel used for pricing and risk analysis of various fixed incomesecurities and their derivatives. The companion CD-ROM containnumerous formulas and programming tools that allow readers tobetter model risk and value fixed income securities. Thiscomprehensive resource provides readers with the hands-oninformation and software needed to succeed in this financialarena. The 2nd edition of this successful book has several new features. The calibration discussion of the basic LIBOR market model has been enriched considerably, with an analysis of the impact of the swaptions interpolation technique and of the exogenous instantaneous correlation on the calibration outputs. A discussion of historical estimation of the instantaneous correlation matrix and of rank reduction has been added, and a LIBOR-model consistent swaption-volatility interpolation technique has been introduced. The old sections devoted to the smile issue in the LIBOR market model have been enlarged into a new chapter. New sections on local-volatility dynamics, and on stochastic volatility models have been added, with a thorough treatment of the recently developed uncertain-volatility approach. Examples of calibrations to real market data are now considered. The fast-growing interest for hybrid products has led to a new chapter. A special focus here is devoted to the pricing of inflation-linked derivatives. The three final new chapters of this second edition are devoted to credit. Since Credit Derivatives are increasingly fundamental, and since in the reduced-form modeling framework much of the technique involved is analogous to interest-rate modeling, Credit Derivatives -- mostly Credit Default Swaps (CDS), CDS Options and Constant Maturity CDS - are discussed, building on the basic short rate-models and market models introduced earlier for the default-free market. Counterparty risk in interest rate payoff valuation is also considered, motivated by the recent Basel II framework developments. This book introduces the mathematics of stochastic interest rate modeling and the pricing of related derivatives, based on a step-by-step presentation of concepts with a focus on explicit calculations. The types of interest rates considered range from short rates to forward rates such as LIBOR and swap rates, which are presented in the HJM and BGM frameworks. The pricing and hedging of interest rate and fixed income derivatives such as bond options, caps, and swaptions, are treated using forward measure techniques. An introduction to default bond pricing and an outlook on model calibration are also included as additional topics.This third edition represents a significant update on the second edition published by World Scientific in 2012. Most chapters have been reorganized and largely rewritten with additional details and supplementary solved exercises. New graphs and simulations based on market data have been included, together with the corresponding R codes.This new edition also contains 75 exercises and 4 problems with detailed solutions, making it suitable for advanced undergraduate and graduate level students. Nowadays, event history analysis

can draw on a well-established set of statistical tools for the description and causal analysis of event history data. The second edition of Event History Analysis with Stata provides an updated introduction to event history modeling, along with many instructive Stata examples. Using the latest Stata software, each of these practical examples develops a research question, refers to useful substantive background information, gives a short exposition of the underlying statistical concepts, describes the organization of the input data and the application of the statistical Stata procedures, and assists the reader in performing a substantive interpretation of the obtained results. Emphasising the strengths and limitations of event history model techniques in each field of application, this book demonstrates that event history models provide a useful approach with which to uncover causal relationships or to map out a system of causal relations. It demonstrates how long-term processes can be studied and how changing context information on the micro, meso, and macro levels can be integrated easily into a dynamic analysis of longitudinal data. Event History Analysis with Stata is an invaluable resource for both novice students and researchers who need an introductory textbook and experienced researchers (from sociology, economics, political science, pedagogy, psychology, or demography) who are looking for a practical handbook for their research. This paper provides a selective overview of nonlinear exchange rate models recently proposed in the literature and assesses their contribution to understanding exchange rate behavior. Two key questions are examined. The first question is whether nonlinear autoregressive models of real exchange rates help resolve the "purchasing power parity (PPP) puzzles." The second question is whether recently developed nonlinear, regime-switching vector equilibrium correction models of the nominal exchange rate can beat a random walk model, the standard benchmark in the exchange rate literature, in terms of out-of-sample forecasting performance. Finally, issues related to the adequateness of standard methods of evaluation of (linear and nonlinear) exchange rate models are discussed with reference to different forecast accuracy criteria. Filling a gap in the literature caused by the recent financial crisis, this book provides a treatment of the techniques needed to model and evaluate interest rate derivatives according to the new paradigm for fixed income markets. Concerning this new development, there presently exist only research articles and two books, one of them an edited volume, both being written by researchers working mainly in practice. The aim of this book is to concentrate primarily on the methodological side, thereby providing an overview of the state-of-the-art and also clarifying the link between the new models and the classical literature. The book is intended to serve as a guide for graduate students and researchers as well as practitioners interested in the paradigm change for fixed income markets. A basic knowledge of fixed income markets and related stochastic methodology is assumed as a prerequisite. The field of financial mathematics has developed tremendously over the past thirty years, and the underlying models that have taken shape in interest rate markets and bond markets, being much richer in structure than equity-derivative models, are particularly fascinating and complex. This book introduces the tools required for the arbitrage-free modelling of the dynamics of these markets. Andrew Cairns addresses not only seminal works but also modern developments. Refreshingly broad in scope, covering numerical methods, credit risk, and descriptive models, and with an approachable sequence of opening chapters, Interest Rate Models will make readers--be they graduate students, academics, or practitioners--confident enough to develop their own interest rate models or to price nonstandard derivatives using existing models. The mathematical chapters begin with the simple binomial model that introduces many core ideas. But the main chapters work their way systematically through all of the main developments in continuous-time interest rate modelling. The book describes fully the broad range of approaches to interest rate modelling: short-rate models, no-arbitrage models, the Heath-Jarrow-Morton framework, multifactor models, forward measures, positive-interest models, and market models. Later chapters cover some related topics, including numerical methods, credit risk, and model calibration. Significantly, the book develops the martingale approach to bond pricing in detail, concentrating on risk-neutral pricing, before later exploring recent advances in interest rate modelling where different pricing measures are important. Containing many results that are new, or which exist only in recent research articles, Interest Rate Modeling: Theory and Practice, 2nd Edition portrays the theory of interest rate modeling as a three-dimensional object of finance, mathematics, and computation. It introduces all models with financial-economical justifications, develops options along the martingale approach, and handles option evaluations with precise numerical methods. 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