

Pricing Bermudan Swaptions In The Libor Market Model

Offering a unique balance between applications and calculations, Monte Carlo Methods and Models in Finance and Insurance incorporates the application background of finance and insurance with the theory and applications of Monte Carlo methods. It presents recent methods and algorithms, including the multilevel Monte Carlo method, the statistical Romberg method, and the Heath–Platen estimator, as well as recent financial and actuarial models, such as the Cheyette and dynamic mortality models. The authors separately discuss Monte Carlo techniques, stochastic process basics, and the theoretical background and intuition behind financial and actuarial mathematics, before bringing the topics together to apply the Monte Carlo methods to areas of finance and insurance. This allows for the easy identification of standard Monte Carlo tools and for a detailed focus on the main principles of financial and insurance mathematics. The book describes high-level Monte Carlo methods for standard simulation and the simulation of stochastic processes with continuous and discontinuous paths. It also covers a wide selection of popular models in finance and insurance, from Black–Scholes to stochastic volatility to interest rate to dynamic mortality. Through its many numerical and graphical illustrations and simple, insightful examples, this book provides a deep understanding of the scope of Monte Carlo methods and their use in various financial situations. The intuitive presentation encourages readers to implement and further develop the simulation methods.

An authoritative handbook on risk management techniques and simulations as applied to financial engineering topics, theories, and statistical methodologies The Handbook of Financial Risk Management: Simulations and Case Studies illustrates the practical implementation of simulation techniques in the banking and financial industries through the use of real-world applications. Striking a balance between theory and practice, the Handbook of Financial Risk Management: Simulations and Case Studies demonstrates how simulation algorithms can be used to solve practical problems and showcases how accuracy and efficiency in implementing various simulation methods are indispensable tools in risk management. The book provides the reader with an intuitive understanding of financial risk management and deepens insight into those financial products that cannot be priced traditionally. The Handbook of Financial Risk Management also features: Examples in each chapter derived from consulting projects, current research, and course instruction Topics such as volatility, fixed-income derivatives, LIBOR Market Models, and risk measures Over twenty-four recognized simulation models Commentary, data sets, and computer subroutines available on a chapter-by-chapter basis As a complete reference for practitioners, the book is useful in the fields of finance, business,

applied statistics, econometrics, and engineering. The Handbook of Financial Risk Management is also an excellent text or supplement for graduate and MBA-level students in courses on financial risk management and simulation. The essential premise of this book is that theory and practice are equally important in describing financial modeling. In it the authors try to strike a balance in their discussions between theories that provide foundations for financial models and the institutional details that provide the context for applications of the models. The book presents the financial models of stock and bond options, exotic options, investment grade and high-yield bonds, convertible bonds, mortgage-backed securities, liabilities of financial institutions--the business model and the corporate model. It also describes the applications of the models to corporate finance. Furthermore, it relates the models to financial statements, risk management for an enterprise, and asset/liability management with illiquid instruments. The financial models are progressively presented from option pricing in the securities markets to firm valuation in corporate finance, following a format to emphasize the three aspects of a model: the set of assumptions, the model specification, and the model applications. Generally, financial modeling books segment the world of finance as "investments," "financial institutions," "corporate finance," and "securities analysis," and in so doing they rarely emphasize the relationships between the subjects. This unique book successfully ties the thought processes and applications of the financial models together and describes them as one process that provides business solutions. Created as a companion website to the book readers can visit www.thomasho.com to gain deeper understanding of the book's financial models. Interested readers can build and test the models described in the book using Excel, and they can submit their models to the site. Readers can also use the site's forum to discuss the models and can browse server based models to gain insights into the applications of the models. For those using the book in meetings or class settings the site provides Power Point descriptions of the chapters. Students can use available question banks on the chapters for studying.

This book is the definitive and most comprehensive guide to modeling derivatives in C++ today. Providing readers with not only the theory and math behind the models, as well as the fundamental concepts of financial engineering, but also actual robust object-oriented C++ code, this is a practical introduction to the most important derivative models used in practice today, including equity (standard and exotics including barrier, lookback, and Asian) and fixed income (bonds, caps, swaptions, swaps, credit) derivatives. The book provides complete C++ implementations for many of the most important derivatives and interest rate pricing models used on Wall Street including Hull-White, BDT, CIR, HJM, and LIBOR Market Model. London illustrates the practical and efficient implementations of these models in real-world situations and discusses the mathematical underpinnings and derivation of the models in a detailed yet accessible manner illustrated by many examples with numerical data as well as

real market data. A companion CD contains quantitative libraries, tools, applications, and resources that will be of value to those doing quantitative programming and analysis in C++. Filled with practical advice and helpful tools, *Modeling Derivatives in C++* will help readers succeed in understanding and implementing C++ when modeling all types of derivatives.

Written to bridge the gap between foundational quantitative finance and market practice, this book goes beyond the basics covered in most textbooks by presenting content concerning actual industry norms, thus resulting in a clearer picture of the field for the readers. These include, for instance, the practitioner's perspective of how local versus stochastic volatility affects forward smile, or the implications of mean reversion on forward volatility. Key considerations for modelling in rates, equities and foreign exchange are presented from the perspective of common themes across various assets, as well as their individual characteristics. The discussion on models emphasizes the key aspects that are relevant to the pricing of different types of financial derivatives, so that the reader can observe how an appropriate choice of models is essential in reflecting the risk profile and hedging considerations for different products. With the knowledge gleaned from this book, readers will attain a more comprehensive understanding of market practice in derivatives modelling. Foreword Foreword (246 KB)

The term Financial Derivative is a very broad term which has come to mean any financial transaction whose value depends on the underlying value of the asset concerned. Sophisticated statistical modelling of derivatives enables practitioners in the banking industry to reduce financial risk and ultimately increase profits made from these transactions. The book originally published in March 2000 to widespread acclaim. This revised edition has been updated with minor corrections and new references, and now includes a chapter of exercises and solutions, enabling use as a course text.

Comprehensive introduction to the theory and practice of financial derivatives. Discusses and elaborates on the theory of interest rate derivatives, an area of increasing interest. Divided into two self-contained parts ? the first concentrating on the theory of stochastic calculus, and the second describes in detail the pricing of a number of different derivatives in practice. Written by well respected academics with experience in the banking industry. A valuable text for practitioners in research departments of all banking and finance sectors. Academic researchers and graduate students working in mathematical finance.

Short rate models are widely used in valuing interest rate derivatives. To fit empirical distribution of interest rates and implied volatility, a possible way is to replace Brownian motion by a Lévy process in short rate models. However, this approach is difficult to implement. This thesis establishes an efficient network approach for interest rate valuation. The FFT-network is essentially an extension of multinomial tree model, taking advantage of the Markov property of Lévy processes. Its fixed and unchanged states at all time, super-calibration ability to the current term structure, and elegant computation procedure for transition probabilities using the fast Fourier transform (FFT) from the characteristic function of Lévy processes make it attractive and distinct from other numerical methods. The interest rate derivatives value is determined in a way similar to that of the tree approach. The comparison between the closed-form solution of interest

rate caplets and swaptions and the numerical results under the network demonstrates that the proposed network is accurate and efficient. In addition, the FFT-network can also be used to pricing the Bermudan swaption and American-style option. Finally, the FFT-network is expanded to accommodate path-dependent variables, and hence can be used for pricing some path-dependent structured notes, such as the target redemption notes and range of accrual notes.

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.

One of Riskbook.com's Best of 2005 - Top Ten Finance Books The Libor market model remains one of the most popular and advanced tools for modelling interest rates and interest rate derivatives, but finding a useful procedure for calibrating the model has been a perennial problem. Also the respective pricing of exotic derivative products such A balanced introduction to the theoretical foundations and real-world applications of mathematical finance The ever-growing use of derivative products makes it essential for financial industry practitioners to have a solid understanding of derivative pricing. To cope with the growing complexity, narrowing margins, and shortening life-cycle of the individual derivative product, an efficient, yet modular, implementation of the pricing algorithms is necessary. Mathematical Finance is the first book to harmonize the theory, modeling, and implementation of today's most prevalent pricing models under one convenient cover. Building a bridge from academia to practice, this self-contained text applies theoretical concepts to real-world examples and introduces state-of-the-art, object-oriented programming techniques that equip the reader with the conceptual and illustrative tools needed to understand and develop successful derivative pricing models. Utilizing almost twenty years of academic and industry experience, the author discusses the mathematical concepts that are the foundation of commonly used derivative pricing models, and insightful Motivation and Interpretation sections for each concept are presented to further illustrate the relationship between theory and practice. In-depth coverage of the common characteristics found amongst successful pricing models are provided in addition to key techniques and tips for the construction of these models. The opportunity to interactively explore the book's principal ideas and

methodologies is made possible via a related Web site that features interactive Java experiments and exercises. While a high standard of mathematical precision is retained, *Mathematical Finance* emphasizes practical motivations, interpretations, and results and is an excellent textbook for students in mathematical finance, computational finance, and derivative pricing courses at the upper undergraduate or beginning graduate level. It also serves as a valuable reference for professionals in the banking, insurance, and asset management industries.

This book constitutes the refereed post-proceedings of the 9th IFIP International Conference on Network and Parallel Computing, NPC 2012, held in Gwangju, Korea, in September 2012. The 38 papers presented were carefully reviewed and selected from 136 submissions. The papers are organized in the following topical sections: algorithms, scheduling, analysis, and data mining; network architecture and protocol design; network security; parallel, distributed, and virtualization techniques; performance modeling, prediction, and tuning; resource management; ubiquitous communications and networks; and web, communication, and cloud computing. In addition, a total of 37 papers selected from five satellite workshops (ATIMCN, ATSME, Cloud&Grid, DATICS, and UMAS 2012) are included.

Analytical Finance is a comprehensive introduction to the financial engineering of equity and interest rate instruments for financial markets. Developed from notes from the author's many years in quantitative risk management and modeling roles, and then for the Financial Engineering course at Mälardalen University, it provides exhaustive coverage of vanilla and exotic mathematical finance applications for trading and risk management, combining rigorous theory with real market application. Coverage includes:

- Date arithmetic's, quote types of interest rate instruments
- The interbank market and reference rates, including negative rates
- Valuation and modeling of IR instruments; bonds, FRN, FRA, forwards, futures, swaps, CDS, caps/floors and others
- Bootstrapping and how to create interest rate curves from prices of traded instruments
- Risk measures of IR instruments
- Option Adjusted Spread and embedded options
- The term structure equation, martingale measures and stochastic processes of interest rates; Vasicek, Ho-Lee, Hull-White, CIR
- Numerical models; Black-Derman-Toy and forward induction using Arrow-Debreu prices and Newton–Raphson in 2 dimension
- The Heath-Jarrow-Morton framework
- Forward measures and general option pricing models
- Black log-normal and, normal model for derivatives, market models and managing exotics instruments
- Pricing before and after the financial crisis, collateral discounting, multiple curve framework, cheapest-to-deliver curves, CVA, DVA and FVA

A comprehensive and self-contained treatment of the theory and practice of option pricing. The role of martingale methods in financial modeling is exposed. The emphasis is on using arbitrage-free models already accepted by the market as well as on building the new ones. Standard calls and puts together with numerous examples of exotic options such as barriers and quantos, for example

on stocks, indices, currencies and interest rates are analysed. The importance of choosing a convenient numeraire in price calculations is explained. Mathematical and financial language is used so as to bring mathematicians closer to practical problems of finance and presenting to the industry useful maths tools.

The first swap was executed over thirty years ago. Since then, the interest rate swaps and other derivative markets have grown and diversified in phenomenal directions. Derivatives are used today by a myriad of institutional investors for the purposes of risk management, expressing a view on the market, and pursuing market opportunities that are otherwise unavailable using more traditional financial instruments. In this volume, Howard Corb explores the concepts behind interest rate swaps and the many derivatives that evolved from them. Corb's book uniquely marries academic rigor and real-world trading experience in a compelling, readable style. While it is filled with sophisticated formulas and analysis, the volume is geared toward a wide range of readers searching for an in-depth understanding of these markets. It serves as both a textbook for students and a must-have reference book for practitioners. Corb helps readers develop an intuitive feel for these products and their use in the market, providing a detailed introduction to more complicated trades and structures. Through examples of financial structuring, readers will come away with an understanding of how derivatives products are created and how they can be deconstructed and analyzed effectively.

The class of interest rate models introduced by O. Cheyette in 1994 is a subclass of the general HJM framework with a time dependent volatility parameterization. This book addresses the above mentioned class of interest rate models and concentrates on the calibration, valuation and sensitivity analysis in multifactor models. It derives analytical pricing formulas for bonds and caplets and applies several numerical valuation techniques in the class of Cheyette model, i.e. Monte Carlo simulation, characteristic functions and PDE valuation based on sparse grids. Finally it focuses on the sensitivity analysis of Cheyette models and derives Model- and Market Greeks. To the best of our knowledge, this sensitivity analysis of interest rate derivatives in the class of Cheyette models is unique in the literature. Up to now the valuation of interest rate derivatives using PDEs has been restricted to 3 dimensions only, since the computational effort was too great. The author picks up the sparse grid technique, adjusts it slightly and can solve high-dimensional PDEs (four dimensions plus time) accurately in reasonable time. Many topics investigated in this book are new areas of research and make a significant contribution to the scientific community of financial engineers. They also represent a valuable development for practitioners.

"This book deals with some of the key derivatives products including equity derivatives, mainly used for creating investment products for retail and private investors, interest rates derivatives, used for creating investment and treasury products, real estate derivatives and hybrid derivatives products"--

This book contains lectures delivered at the celebrated Seminar in Mathematical Finance at the Courant Institute. The lecturers and presenters of papers are prominent researchers and

practitioners in the field of quantitative financial modeling. Most are faculty members at leading universities or Wall Street practitioners. The lectures deal with the emerging science of pricing and hedging derivative securities and, more generally, managing financial risk. Specific articles concern topics such as option theory, dynamic hedging, interest-rate modeling, portfolio theory, price forecasting using statistical methods, etc. Contents: Estimation and Data-Driven Models: Transition Densities for Interest Rate and Other Nonlinear Diffusions (Y Aït-Sahalia) Hidden Markov Experts (A Weigend & S-M Shi) When is Time Continuous? (A Lo et al.) Asset Prices are Brownian Motion: Only in Business Time (H Geman et al.) Hedging Under Stochastic Volatility (K Ronnie Sircar) Model Calibration and Volatility Smile: Determining Volatility Surfaces and Option Values from an Implied Volatility Smile (P Carr & D Madan) Reconstructing the Unknown Local Volatility Function (T Coleman et al.) Building a Consistent Pricing Model from Observed Option Prices (J-P Laurent & D Leisen) Weighted Monte Carlo: A New Technique for Calibrating Asset-Pricing Models (M Avellaneda et al.) Pricing and Risk Management: One- and Multi-Factor Valuation of Mortgages: Computational Problems and Shortcuts (A Levin) Simulating Bermudan Interest-Rate Derivatives (P Carr & G Yang) How to Use Self-Similarities to Discover Similarities of Path-Dependent Options (A Lipton) Monte Carlo Within a Day (J Cárdenas et al.) Decomposition and Search Techniques in Disjunctive Programs for Portfolio Selection (K Wyatt) Readership: Students and researchers in economics, finance and applied mathematics. Keywords: One of Riskbook.com's Best of 2005 - Top Ten Finance Books The Libor market model remains one of the most popular and advanced tools for modelling interest rates and interest rate derivatives, but finding a useful procedure for calibrating the model has been a perennial problem. Also the respective pricing of exotic derivative products such as Bermudan callable structures is considered highly non-trivial. In recent studies, author John Schoenmakers and his colleagues developed a fast and robust implied method for calibrating the Libor model and a new generic procedure for the pricing of callable derivative instruments in this model. Within a compact, self-contained review of the requisite mathematical theory on interest rate modelling, *Robust Libor Modelling and Pricing of Derivative Products* introduces the author's new approaches and their impact on Libor modelling and derivative pricing. Discussions include economically sensible parametrisations of the Libor market model, stability issues connected to direct least-squares calibration methods, European and Bermudan style exotics pricing, and lognormal approximations suitable for the Libor market model. A look at the available literature on Libor modelling shows that the issues surrounding instability of calibration and its consequences have not been well documented, and an effective general approach for treating Bermudan callable Libor products has been missing. This book fills these gaps and with clear illustrations, examples, and explanations, offers new methods that surmount some of the Libor model's thornier obstacles.

This book addresses selected practical applications and recent developments in the areas of quantitative financial modeling in derivatives instruments, some of which are from the authors' own research and practice. While the primary scope of this book is the fixed-income market (with further focus on the interest rate market), many of the methodologies presented also apply to other financial markets, such as the credit, equity, and foreign exchange markets. This book, which assumes that the reader is familiar with the basics of stochastic calculus and derivatives modeling, is written from the point of view of financial engineers or practitioners, and, as such, it puts more emphasis on the practical applications of financial mathematics in the real market than the mathematics itself with precise (and tedious) technical conditions. It attempts to combine economic insights with mathematics and modeling so as to help the reader develop intuitions. In addition, the book addresses the counterparty credit risk modeling, pricing, and arbitraging strategies, which are relatively recent developments and are of increasing importance. It also discusses various trading structuring

strategies and touches upon some popular credit/IR/FX hybrid products, such as PRDC, TARN, Snowballs, Snowbears, CCDS, credit extinguishers."

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

In this thesis, we study two practical problems in applied mathematical finance. The first topic discusses the issue of pricing and hedging Bermudan swaptions within a one factor Markov-functional model. We focus on the implications for hedging of the choice of instantaneous volatility for the one-dimensional driving Markov process of the model. We find that there is a strong evidence in favour of what we term "parametrization by time" as opposed to "parametrization by expiry". We further propose a new parametrization by time for the driving process which takes as inputs into the model the market correlations of relevant swap rates. We show that the new driving process enables a very effective vega-delta hedge with a much more stable gamma profile for the hedging portfolio compared with the existing ones. The second part of the thesis mainly addresses the topic of pricing European options within the popular stochastic volatility SABR model and its extension with mean reversion. We investigate some efficient approximations for these models to be used in real time. We first derive a probabilistic approximation for three different versions of the SABR model: Normal, Log-Normal and a displaced diffusion version for the general constant elasticity of variance case. Specifically, we focus on capturing the terminal distribution of the underlying process (conditional on the terminal volatility) to arrive at the implied volatilities of the corresponding European options for all strikes and maturities. Our resulting method allows us to work with a variety of parameters which cover long dated options and highly stress market condition. This is a different feature from other current approaches which rely on the assumption of very small total volatility and usually fail for longer than 10 years maturity or large volatility of volatility. A similar study is done for the extension of the SABR model with mean reversion (SABR-MR). We first compare the SABR model with this extended model in terms of forward volatility to point out the fundamental difference in the dynamics of the two models. This is done through a numerical example of pricing forward start options. We then derive an efficient probabilistic approximation for the SABRMR model to price European options in a similar fashion to the one for the SABR model. The numerical results are shown to be

still satisfactory for a wide range of market conditions.

The focus of this volume is on the development of new approaches for the market-conform valuation of newly issued derivatives. The first chapter presents a flexible approach to construct the binomial process of the underlying asset price by using a simultaneously backward and forward induction algorithm. This framework can be used to price and hedge a wide range of plain-vanilla and exotic options. In the second chapter this new approach is compared to existing models using a sample of plain-vanilla options, American call options and European Barrier options from two competing markets. In the third chapter new methods to value American-style options via Monte Carlo simulations in accordance with given market prices are discussed. After a short introduction to Monte Carlo methods, two new approaches are proposed. These new frameworks are illustrated via pricing examples for standard American put options. This paper provides an extensive treatment of the entire Monte Carlo simulation theory. Furthermore, the Monte Carlo technique is used for addressing the pricing of various interest rate derivatives in different term structure models by the simulation approach. With the rising complexity and diversity of upcoming derivative securities, analytically tractable or closed-form pricing methods are difficult to find or even inexistent. If the thoroughly popular lattice valuation approach additionally fails due to non-recombining characteristics, Monte Carlo simulation represents a powerful and flexible alternative pricing method. The goal of this paper is to discuss and implement the fundamentals of Monte Carlo methods and to introduce the wide use of this approach in finance, especially in interest rate derivative valuation. The paper is roughly divided into three parts. The first part focuses on random number generation and on increasing efficiency methods for Monte Carlo, such as variance reduction techniques or low-discrepancy sequences. In the following part different term structure models are developed and the link to the simulation theory is eventually established. In the third and final part some ordinary and extended Monte Carlo algorithms are implemented and corresponding simulations are run in order to analyze Bermudan swaption prices in detail. Even though Monte Carlo methods feature a relatively slow but given convergence rate, they remain a competitive tool in financial applications. They owe their rising popularity to a large extent to their flexibility and to recent progress in methods which improve their accuracy and precision in estimating quantities of interest. Moreover, some of the leading yield curve models are heavily relying on Monte Carlo techniques. Several extensions of the standard Monte Carlo approach, such as least-squares Monte Carlo, for instance, are able to overcome the early-exercise hurdle a.

"Richard Flavell has a strong theoretical perspective on swaps with considerable practical experience in the actual trading of these instruments. This rare combination makes this welcome updated second edition a useful reference work for market practitioners." —Satyajit Das, author of *Swaps and Financial Derivatives Library and Traders and Guns & Money: Knowns and Unknowns in the Dazzling World of Derivatives* Fully revised and updated from the first edition, *Swaps and Other Derivatives, Second Edition*, provides a practical explanation of the pricing and evaluation of swaps and interest rate derivatives. Based on the author's extensive experience in derivatives and risk management, working as a financial engineer, consultant and trainer for a wide range of institutions across the world this book discusses in detail how many of the wide range of swaps and other derivatives, such as

yield curve, index amortisers, inflation-linked, cross-market, volatility, diff and quanto diffs, are priced and hedged. It also describes the modelling of interest rate curves, and the derivation of implied discount factors from both interest rate swap curves, and cross-currency adjusted curves. There are detailed sections on the risk management of swap and option portfolios using both traditional approaches and also Value-at-Risk.

Techniques are provided for the construction of dynamic and robust hedges, using ideas drawn from mathematical programming. This second edition has expanded sections on the credit derivatives market – its mechanics, how credit default swaps may be priced and hedged, and how default probabilities may be derived from a market strip. It also prices complex swaps with embedded options, such as range accruals, Bermudan swaptions and target accrual redemption notes, by constructing detailed numerical models such as interest rate trees and LIBOR-based simulation. There is also increased discussion around the modelling of volatility smiles and surfaces. The book is accompanied by a CD-ROM where all the models are replicated, enabling readers to implement the models in practice with the minimum of effort.

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.

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