Choice of Interest Rate Term Structure Models for A sets and Liability Management

Interest Rate Models - Theory and Practice
This paper studies the effect of forward rate correlations on caplet and swaption prices. A two-factor HJM lognormal model of forward rates that implies a realistic covariance matrix of forward rates is constructed. A one-factor lognormal model, with the same forward rate volatilities as the two-factor one, is employed for comparison purposes. The one- and two-factor models price European caplets identically. The one-factor model overprices European swaptions as expected. But the magnitude of overpricing is surprisingly small, less than three percent for at-the-money swaptions on five-year semi-annual swaps. The overpricing is less for shorter swap lengths. The surprising result is that the one-factor model underprices both American caplets and American-type swaptions. Five-year at-the-money American caplets on six-month rates are underpriced by as much as twelve percent and three-year at-the-money constant maturity Bermudan swaptions on two-year semi-annual swaps by as much as ten percent. The underpricing is relatively low for six-month and one-year options but increases with option maturity and forward rate decorrelation. Unlike constant maturity Bermudan swaptions, regular Bermudan swaptions are overpriced by the one-factor model by more than four percent in the case of three-year maturity swaptions. An intuitive explanation for the underpricing of American options under the one-factor model is offered. This explanation implies that American options on any type of interest rate security would be underpriced if perfect correlation across the forward rate term structure is assumed.

Dependence of Bermudan Swaptions on Volatility Structure - Computational Comparisons in the Lognormal Forward LIBOR Market Model

Bermudan swaptions have until recently been valued using only one-factor models such as the Black-Derman-Toy (BDT) or Black-Karasinski (BK) models. The LIBOR Market (LM) model which is a more general multi-factor model is becoming increasingly popular as a benchmark model. Whereas the BDT and BK models can be approximated using a lattice facilitating easy valuation of Bermudan swaption, the LM model does not conform to the lattice framework and as such the valuation seems very difficult. Monte-Carlo simulation is a popular alternative to the lattice framework for derivatives valuation. In order to facilitate valuation of Bermudan swaptions the Monte-Carlo simulation technique must be extended. A few methods doing this are presently available, eg [A9d98]. A common feature of these methods is that the estimated option premia are only lower bounds on the true premia. The Stochastic Mesh method proposed by [BG97b] for valuation of Bermudan (equity) options with applications to equity options on stocks with known and an upper bound. We have applied this method to the LM model and used this to verify the premia found by Andersen. We will also apply the approach suggested in [LS98] to the LM model and verify the premia found using that approach. As it turns out this approach is a special case of the [A9d98] approach. Furthermore we also examine the impact on the Bermudan swaption premia when moving from a LM model with only one factor to a LM model with multiple factors and do indeed find a significant—but not dramatic—impact. We find the [A9d98] and [LS98] approaches to be mutually consistent and in line with results obtained from low-biased Stochastic Mesh estimates.

A Simple Approach to the Pricing of Bermudan Swaptions in the Multi-Factor LIBOR Market Model

Pricing of Bermudan-style Interest Rate Derivatives
This article presents a novel approach for calculating swap vegga per bucket in the Libor BGM model. We show that for some forms of the volatility an approach based on re-calibration may lead to a large uncertainty in estimated swap vegga, as the instantaneous volatility structure may be distorted by re-calibration. This does not happen in the case of constant swap rate volatility. We then derive an alternative approach, not based on re-calibration, by comparison with the swap market model. The strength of the method is that it accurately estimates vegga for any volatility function and at a low number of simulation paths. The key to the method is that the perturbation in the Libor volatility is distributed in a clear, stable and well understood fashion, whereas in the re-calibration method the change in volatility is hidden and potentially unstable.

Modern Pricing of Interest-Rate Derivatives
This paper compares the pricing and hedging performance of the LMM model against two spot-rate models, namely Hull-White and Black-Karasinski, and the more recent Swap Market model. The LMM model dominates in the pricing exercise. The hedging performance of all four models is similar for the Euro market. For the USD market, the short rate models perform marginally better than the LMM model in terms of model parameter stability and smaller pricing and hedging errors.
Pricing of Bermudan Swaptions Using Calibrated LIBOR Market Models

Exotic interest rate derivatives are hard to value. Care must be taken to make sure that sources of volatility that impact the contingent claim are properly modeled, and that appropriate relationships are maintained between the underlying rates involved. In this presentation, we outline the issues involved in valuing exotics. We review valuation issues for interest rate derivatives in general, and for caps, floors, and swaptions. We outline a pricing methodology and apply it to Bermudan swaptions, range accruals, callable range accruals, spread options and callable spread range accruals. Outlines:

1. Review of interest rate modeling
2. Handling of vanilla options
3. Forward Libor and swap rates
4. Caps and Floors
5. Swaptions
6. Cap stripping
7. Smile lifting
8. Bermudan valuation
9. Hedging Bermudans
10. LGM model specification of the HW model
11. Pricing cashflows and options under the LGM model
12. Model calibration
13. Numerical methods
14. Digital options
15. Pricing via Vanillas
16. Range accruals
17. Pricing as a portfolio of digitals
18. Convexity adjustment
19. Change of measure and approximation
20. Callable range accruals
21. Pricing under the one factor LGM model
22. Model calibration
23. Use of control variates (adjusters)
24. Calibration and pricing under the two factor LGM model

Does Correlation Matter in Pricing Caps and Swaptions?

This paper investigates the effect of interest rate correlation in the pricing of Bermudan swaptions. Investigating both Gaussian Markov models and Libor Market models, we find that Bermudan swaption prices depend only weakly on the number of factors in the underlying interest rate model. Moreover, we find that prices of standard Bermudan swaptions typically decrease slightly in the number of factors, primarily a consequence of effects on the time evolution of volatility induced by calibration of the model dynamics. Our findings are markedly different from those of Longstaff, Schwarz, and Santa-Clara (1999) who conclude that single-factor interest rate models significantly underestimate Bermudan swaptions. We argue that the conclusions of Longstaff, Schwarz, and Santa-Clara are due to non-standard choices of model dynamics and calibration methodology. Our study highlights the importance of using a reasonable set of calibration instruments when applying models and when comparing interest rate models.

Handbook of Financial Risk Management

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.

Quantitative Analysis in Financial Markets

Factor Dependence of Bermudan Swaption Prices Offering a unique balance between applications and calculations, Mone 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.

Robust Libor Model Hedging and Pricing of Derivative Products 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 Models. 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, Mone Carlo Hedging Derivatives in C++ will help readers succeed in understanding and implementing C++ when modeling all types of derivatives.

Pricing of Bermudan Swaptions Under OIS Discounting

Interest Rate Derivatives Manufacturing and Managing Customer-Driven Derivatives Manufacturing and Managing Customer-Driven Derivatives sheds light on customer-driven derivative products and their manufacturing process,
File Type PDF Pricing Bermudan Swaptions In The Libor Market Model

can which process a complex problem for even experienced financial practitioners. This authoritative text offers up-to-date knowledge and practices across a broad range of topics that address the entire manufacturing, pricing and risk management process, including practical knowledge and industrial best practices. This resource blends quantitative and business perspectives to provide an in-depth understanding of the derivative risk management skills that are necessary to adopt in the competitive financial industry. Manufacturing and managing customer-driven derivative products have become more complex due to macro factors such as the multi-curve environments triggered by the recent financial crises, stricter regulatory requirements of consistent modelling and managing frameworks, and the need for risk/reward optimisation. Explore the fundamental components of the derivatives business, including equity derivatives, interest rates derivatives, real estate derivatives, and real life derivatives, etc. Examine the life cycle of manufacturing derivative products and practical pricing models. Deep dive into a wide range of customer-driven structured derivative products, their investment or hedging payoff features and associated risk exposures. Examine the implications of changing regulatory standards, which can increase costs in the banking sector. Discover practical yet sophisticated product analysis, quantitative modeling, infrastructure integration, risk analysis, and hedging analysis. Gain insight on how banks should handle complex derivatives products. Manufacturing and Managing Customer-Driven Derivatives is an essential guide for quants, derivatives traders, risk managers, business executives, quant traders, structurers, risk managers, financial industry professionals, hedge fund managers, academic lecturers, and financial math students who are interested in looking at the bigger picture of the manufacturing, pricing and risk management process of customer-driven derivative transactions.

The Concepts and Practice of Mathematical Finance. This paper considers the pricing of Bermuda-style swaptions in the Libor market model (Brace et al (1997), Jamshidian (1997), Miltersen et al (1997)) and its extensions (Andersen and Andreasen (1998)). Due to its large number of state variables, application of lattice methods to this model class is generally not feasible, and we instead focus on a simple technique to incorporate early exercise features into the Monte Carlo method. Our approach involves a direct search for an early exercise boundary parametrized in intrinsic value and the values of still-alive swaptions. We compare results of the proposed algorithm against prices obtained from Markov Chain approximations and finite difference methods. The proposed algorithm is fast and robust, and produces a lower bound on Bermudan swaption prices that appears to be very tight for many realistic structures. The paper contains several numerical results against which other methods can be tested.

Monte Carlo Methods and Models in Finance and Insurance. We build a multi-factor, no-arbitrage model of the term structure of interest rates. The stochastic factors are the short-term interest rate and the premia of the futures rates over the short-term interest rate. In the three-factor version of the model, for example, the first factor is the three-month Libor, the second factor is the premium of the first futures Libor over spot Libor, and the third factor is the incremental premium of the second futures over the first. The model provides an extension of the lognormal interest rate model of Black and Karasinski (1991) to multiple factors, each of which can exhibit mean-reversion. The method is computationally efficient for several reasons. First, since our model is based on LIBOR futures prices, we can satisfy the no-arbitrage condition without resorting to iterative methods. Second, we modify and implement the binomial approximation methodology of Nelson and Ramaswamy (1990) and Ho, Stapleton and Subrahmanyan (1995) to compute a multi-period tree of rates with the no-arbitrage property. The method uses a recombining two or three-dimensional binomial lattice of interest rates that minimizes the number of states and term structures over time. In addition to these computational advantages, a key feature of the model is that it is consistent with the observed term structure of futures rates as well as the term structure of volatilities implied by the prices of interest rate caps and floors. We use the model to price European-style, Bermudan-style, and American-style swaptions. To implement the methodology, we first calibrate the model to the caplet implied-volatility curve on a given day, and then use the model to price European-style swaptions. We find that the two-factor model, where the LIBOR mean reverts rapidly to a slowly mean-reverting second factor, overprices the swaptions relative to market quotations. However, introducing a third factor significantly reduces the overpricing. Finally, we re-calibrate the two-factor model simultaneously to caplet and swaption prices and use the model output to price Bermudan-style swaptions.

Bermudan Swaptions

Interest Rate Modeling The LIBOR Market Model (LMM) is the first model of interest rates dynamics consistent with the market practice of pricing interest rate derivatives and therefore it is widely used by financial institutions for valuation of interest rate derivatives. This book provides a full practitioner's approach to the LIBOR Market Model. It adopts the specific language of a quantitative analyst to the largest possible level and is one of first books on the subject written entirely by quants. The book is divided into three parts: theory, calibration and simulation. New and important issues are covered, such as various drift approximations, various parametric and nonparametric calibrations, and the uncertain volatility approach to smile modeling; a version of the HJM model based on market observables and the duality between BGM and HJM models. Co-authored by Dariusz Gatarek, the §G in the BGM model provides an extension of the lognormal interest rate model of Black and Karasinski (1991) to multiple factors, each of which can exhibit mean-reversion. The method is computationally efficient for several reasons. First, since our model is based on LIBOR futures prices, we can satisfy the no-arbitrage condition without resorting to iterative methods. Second, we modify and implement the binomial approximation methodology of Nelson and Ramaswamy (1990) and Ho, Stapleton and Subrahmanyan (1995) to compute a multi-period tree of rates with the no-arbitrage property. The method uses a recombining two or three-dimensional binomial lattice of interest rates that minimizes the number of states and term structures over time. In addition to these computational advantages, a key feature of the model is that it is consistent with the observed term structure of futures rates as well as the term structure of volatilities implied by the prices of interest rate caps and floors. We use the model to price European-style, Bermudan-style, and American-style swaptions. To implement the methodology, we first calibrate the model to the caplet implied-volatility curve on a given day, and then use the model to price European-style swaptions. We find that the two-factor model, where the LIBOR mean reverts rapidly to a slowly mean-reverting second factor, overprices the swaptions relative to market quotations. However, introducing a third factor significantly reduces the overpricing. Finally, we re-calibrate the two-factor model simultaneously to caplet and swaption prices and use the model output to price Bermudan-style swaptions.


Choice of One Factor Interest Rate Term Structure Models for Pricing and Hedging Bermudan Swaptions. 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, Ricardo 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.

Stochastic Interest Rate Modeling With Fixed Income Derivative Pricing (Third Edition)

The SABR/LIBOR Market Model: 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 callible 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.

Swap market model

Interest Rate Swaps and Other Derivatives A n authorative handbook on risk management techniques and simulations as applied to financial engineering topics, theories, and statistical methodologies The Handbook of Financial Risk M anagement: 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 coursework 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 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.

Pricing Bermudan Swaptions in the LIBOR Market Model 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.

Financial Derivatives in Theory and Practice An up-to-date look at the evolution of interest rate swaps and derivatives Interest Rate Swaps and Derivatives bridges the gap between the theory of these instruments and their actual use in day-to-day life. This comprehensive guide covers the main "rates" products, including swaps, options (cap/floors, swaptions), CMS products, and Bermudan callables. It also covers the main valuation techniques for the exotics/structured-notes area, which remains one of the most challenging parts of the market. Provides a balance of relevant theory and real-world trading instruments for rate swaps and swap derivatives Uses simple settings and illustrations to reveal key results Written by an experienced trader who has worked with swaps, options, and exotics This book, author Amir Sadr shares his valuable insights with practitioners in the field of interest rate derivatives-from traders and marketers to those in operations.

Modeling Derivatives in C++ 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 products 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.

Bermudan Swaptions in the Libor Market Model

Novel Methods in Computational Finance

Monte Carlo Methods for Pricing and Hedging This book introduces the mathematics of stochastic interest rate modelling 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.
The valuation of Caps, Floors and Swaptions in a Multi-Factor Spot-Rate Model

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 quantitatively 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. A. It-Sahalia) Hidden Markov Experts (A. Weissgarten & S. M. Shih) 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 Sirca) Môdel Calibration and Volatility Smile: Determining Volatility Surfaces and Option Values from an Implied Volatility Smile (P. Carr & D. M.adan) Reconstructing the Unknown Local Volatility Function (T. Coleman et al.) Building a Consistent Pricing Model from Observed Option Prices (I.-P. Laurent & D. L. Leisen) Weighted Monte Carlo: A New Technique for Calibrating Asset-Pricing Models (M. A. Vellena 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:

Efficient Control Variates and Strategies for Bermudan Swaptions in a Libor Market Model

“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, and our students, will find it of great value in our courses. This book is a valuable text for practitioners in research departments of all banking and finance sectors. Academic researchers and graduate students working in mathematical finance.

Risk Managing Bermudan Swaptions in the Libor BGM Model

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 (swaps 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. 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 is not 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


Valuation of Exotic Interest Rate Derivatives - Bermudans and Range Accruals

The Libor Market Model in Practice

In this paper we examine the cost of using recalibrated single-factor models to determine the exercise strategy for Bermudan swaptions in a multi-factor world. We demonstrate that single-factor exercise strategies applied in a multi-factor world only give rise to economically insignificant losses. Furthermore, we find that the conditional model risk as defined in Longstaff, Santa-Clara, and Schwartz (2001), is statistically insignificant given the number of observations. A does not allow for the use of option pricing within the asset class. A more recent model of Andersen and Broadie (2001) indicates that losses found in Longstaff et al. (2001) cannot as claimed be ascribed to the number of factors. Finally, we find that for valuation of Bermudan swaptions with long exercise periods, the simple approach proposed in Andersen (2000) is outperformed by the Least Square Monte Carlo method of Longstaff and Schwartz (2001) and, surprisingly, also by the exercise strategies from the single-factor models.

Explicit European Swaption Formula in a Separable One-Factor Libor Market Model

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. This 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. A cademic researchers and graduate students working in mathematical finance.

On the Suboptimality of Single-Factor Exercise Strategies for Bermudan Swaptions

"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."

Interest Rate Swaps and Their Derivatives

In the framework of the Libor Market Model (LMM) an explicit pricing formula is obtained for European swaptions. The LMM used is a displaced diffusion also called Bond Market Model (BMM). The results are similar to the ones obtained for the Gaussian HJM. The extension to bond futures and 2-Bermudan swaptions is also provided.

 Manufacturing and Managing Customer-Driven Derivatives

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