



The SABR/LIBOR Market Model: Pricing, Calibration and Hedging for Complex Interest-Rate Derivatives

By Riccardo Rebonato, Kenneth McKay, Richard White

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The SABR/LIBOR Market Model: Pricing, Calibration and Hedging for Complex Interest-Rate Derivatives By Riccardo Rebonato, Kenneth McKay, Richard White

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.

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Editorial Review

From the Inside Flap

“This is the best of Rebonato’s books. The conversational spirit of the previous manuscripts is here pleasantly retained. But, the value added is the mathematical rigor that permeates the description of the proposed model. Definitely a must.”

Fabio Mercurio, Senior Quantitative Analyst, Bloomberg New York

“A book that has all the hallmarks of Riccardo Rebonato: rigorous theory, up-to-date market knowledge, practical application, and empirical testing to destruction. This time, with co-authors, he applies himself to the most central banking market: LIBOR-related contracts.”

Ian Cooper, Professor of Finance, London Business School

“In this concise book Riccardo Rebonato and his co-authors introduce a new financially motivated model combining the best features of the Libor Market and SABR models. The authors provide a useful roadmap to pricing, calibrating, and hedging interest rate derivatives in the new framework. The book will be of interest to practitioners and academics alike.”

Alexander Lipton, Managing Director, Merrill Lynch and Visiting Professor, Imperial College

From the Back Cover

The authors take two market standards, the SABR and the LIBOR Market Model (LMM) and produce a coherent synthesis for the pricing of complex interest rate derivatives. The SABR model has become the market standard to recover the price of European options. Its main strengths are its financial justifiability, and its ability to recover the dynamics of the smile evolution when the underlying changes. However, the SABR model treats each European option in isolation. The processes for forward rates and swap rates cannot easily be combined to create coherent dynamics for the entire yield curve.

With their new model, the authors bring the dynamics of the various forward rates and stochastic volatilities under a single measure, and derive ‘drift adjustments’ to ensure the absence of arbitrage and to allow for the pricing of complex derivatives. The credible evolution of future smiles generated by the model is essential to complex derivatives pricing as it determines future prices for caplets and swaptions and therefore plausible re-hedging costs.

The authors calibrate their model to hedging instruments in a way that is both accurate and extremely simple. They also propose a pragmatic hedging approach, inspired by work done with the two-state Markov-chain approach which relies on the empirical regularities of the dynamics of the smile surface and the robustness of the fits proposed. The final chapter considers ‘survival’ hedging in times of market turmoil. It does so by providing a set of transactions that can protect the value of a complex derivatives book in a stressed market.

The extension of the LMM model provides a valid description of the financial reality while retaining tractability, computational speed and ease of calibration. The goal for the new model is to offer the ability to reduce uncertainty in market prices to an acceptable minimum by making as judicious a use as possible of the econometric information available. The grounding in empirical information of the modelling approach

utilised by the authors differentiates this title from the stochastic-calculus-heavy, but empirically light, work of others.

The title will be of interest to quantitative analysts, quantitative developers, risk managers and traders in complex derivatives.

About the Author

Riccardo Rebonato is Global Head of Market Risk and Global Head of the Quantitative Research Team at RBS. He is a visiting lecturer at Oxford University (Mathematical Finance) and adjunct professor at Imperial College (Tanaka Business School). He sits on the Board of Directors of ISDA and on the Board of Trustees for GARP. He is an editor for the *International Journal of Theoretical and Applied Finance*, for *Applied Mathematical Finance*, for the *Journal of Risk* and for the *Journal of Risk Management in Financial Institutions*. He holds doctorates in Nuclear Engineering and in Science of Materials/Solid State Physics. He was a research fellow in Physics at Corpus Christi College, Oxford, UK. **Kenneth McKay** is a PhD student at the London School of Economics following a first class honours degree in Mathematics and Economics from the LSE and an MPhil in Finance from Cambridge University. He has been working on interest rate derivative-related research with Riccardo Rebonato for the past year. **Richard White** holds a doctorate in Particle Physics from Imperial College London, and a first class honours degree in Physics from Oxford University. He held a Research Associate position at Imperial College before joining RBS in 2004 as a Quantitative Analyst. His research interests include option pricing with Levy Processes, Genetic Algorithms for portfolio optimisation, and Libor Market Models with stochastic volatility. He is currently taking a fortuitously timed sabbatical to pursue his joint passion for travel and scuba diving.

Users Review

From reader reviews:

April Wages:

Reading a guide tends to be new life style in this era globalization. With studying you can get a lot of information that will give you benefit in your life. Together with book everyone in this world could share their idea. Textbooks can also inspire a lot of people. A lot of author can inspire all their reader with their story or maybe their experience. Not only situation that share in the textbooks. But also they write about the information about something that you need example. How to get the good score toefl, or how to teach your young ones, there are many kinds of book which exist now. The authors in this world always try to improve their proficiency in writing, they also doing some research before they write on their book. One of them is this The SABR/LIBOR Market Model: Pricing, Calibration and Hedging for Complex Interest-Rate Derivatives.

Douglas Dossett:

People live in this new moment of lifestyle always aim to and must have the free time or they will get lot of stress from both day to day life and work. So , once we ask do people have time, we will say absolutely yes. People is human not really a robot. Then we question again, what kind of activity do you have when the spare time coming to anyone of course your answer will unlimited right. Then do you try this one, reading publications. It can be your alternative inside spending your spare time, typically the book you have read will be The SABR/LIBOR Market Model: Pricing, Calibration and Hedging for Complex Interest-Rate Derivatives.

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Brenda Nunez:

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