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Book Review

Interest Rate Models; Theory and Practice, by Damien Brigo and Fabio Mercurio, Springer Verlag, Berlin.

This book combines the theory of interest rate derivatives pricing in an excellent way with a description of the issues that might arise when the theory is brought into practice. Reading the book it becomes clear that the authors combine an academic background with working in the model development area of a financial institution. Hence, the book is of great interest to both academics and practitioners.

Interest rate derivates are definitely the most important contracts traded not only between financial institutions but also with their clients. Since the introduction of swaps in the early eighties interest rate derivatives have definitely surpassed equity and FX derivatives in importance in the OTC markets. Also the recently introduced credit derivatives still have a long way to go before they can compete in trading volumes. Not only the higher volumes but also the complexity in modelling of interest rate derivatives has provoked attention from both academics and traders. Where derivatives on single stocks can be priced based on information on the underlying stock, interest rate derivatives usually depend on a large number of different spot and forward interest rates. Dependence on different underlying variables implicates that not only volatilities, but also correlations play an important role in pricing and hedging. Since the early eighties an enormous amount of academic research has been devoted to modelling of interest rate dynamics. In contrast to equity derivate modelling where all developments can be seen as extensions of the basic Black-Scholes approach, a large amount of alternative approaches to interest rate modelling has been considered, from the early short rate model of Vasicek to the recent Libor and swap market rate models.

As stated the book not only focuses on the theory of interest rate derivatives but also has an option eye for practical issues that will surface if one wants to apply the theory. The first chapters describe the theory starting of with definitions of different interest rates, no arbitrage conditions, choices and changes of numeraires and pricing by no arbitrage. Next the classic models such as Vasicek, Cox-Ingersoll-Ross, Hull and White, Black-Karasinski and extensions of these models are discussed. After a very short chapter on the Heath-Jarrow-Morton framework follow the LIBOR and Swap Market Models which are the most important models presented in this book. The authors not only describe the theory behind these models but also

extensively discuss calibration issues, with a focus on analytical approximations to enhance the calibration process, implication of different assumptions for correlations (e.g., terminal correlations) and the connection between LIBOR Market and Swap Market Models. Also interesting are the discussions on different forms of interest rate and volatility term structures and especially the skews and smiles.

After the theoretical part, which in fact is not only theory, the second part of the book looks at pricing of different instruments depending on a single interest rate term structure such as Constant Maturity Swaps, In Arrear Swaps and Bermudan Swaptions, using the Longstaff-Schwartz methodology to determine early exercise. A nice feature of this part is that most products are priced with at least two different methodologies and the outcomes are compared with each other. In the same manner products depending on two term structures, such as Quanto's and Diff Swaps are discussed. Finally, there is a chapter on equity derivatives with stochastic interest rates.

All in all this book is very well written and can be best compared with a few others. First with Musiela and Rutkowski (1997), but the present book is focussed on interest rates and has a more practical flavor. Second with Pelsser (2000), which is more condensed and mainly interest rate theory. Finally, it can be compared with Rebonato (1998), but in the present book more interest rate derivatives theory is presented.

References

Musiela, M. and Rutkowski, M. (1997) *Martingale Methods in Financial Modelling*, Springer Verlag, Berlin.

Pelsser, A. A. J. (2000) *Efficient Methods for Valuing Interest Rate Derivatives*, Springer Verlag, Heidelberg.

Rebonato, R. (1998) *Interest Rate Option Models*, Second Edition, Wiley, Chichester.

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