

Markov-functional interest rate models

Phil Hunt¹, Joanne Kennedy², Antoon Pelsser³

¹ Global Derivatives and Fixed Income Markets, Westdeutsche Landesbank, Glinzestraße, 53756 Glinzeburg-Smet, London EC2V 6AN, United Kingdom (e-mail: phil.hunt@westlfb.co.uk)

² Department of Statistics, University of Warwick, Coventry CV4 7AL, United Kingdom (e-mail: j.k.kennedy@warwick.ac.uk)

³ Structured Products Group (AA4400), ABN-Amro Bank, P.O. Box 283, 1000 EA Amsterdam, The Netherlands (e-mail: pelsser@fsw-ar.nl) and Department of Finance, Erasmus University Rotterdam, P.O. Box 1738, 3000 DR Rotterdam, The Netherlands

Abstract. We introduce a general class of interest rate models in which the value of pure discount bonds can be expressed as a functional of some (low-dimensional) Markov process. At the abstract level this class includes all current models of practical importance. By specifying these models in Markov-functional form, we obtain a specification which is efficient to implement. An additional advantage of Markov-functional models is the fact that the specification of the model can be such that the forward rate distribution implied by market option prices can be fitted exactly, which makes these models particularly suited for derivatives pricing. We give examples of Markov-functional models that are fitted to market prices of caps/floors and swaptions.

Key words: Yield curve modelling, derivatives pricing, Markov processes

JEL Classification: G13, E43

Mathematics Subject Classification (1991): 60G44, 60J25, 90A09

1 Introduction

Amongst practitioners in the interest rate derivatives market a consensus is starting to emerge as to the desirable and most important properties of an interest rate pricing model. These properties stem from the way these models are used in practice. To determine the prices of exotic derivatives, pricing models are used as 'extrapolation tools'. First the model parameters are chosen so that the model values of relevant liquid instruments agree with market prices, then the model is

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