

Markov-functional interest rate models

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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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Table of Contents Markov Functional Interest Rate Models Springer

1. Understanding the eBook Markov Functional Interest Rate Models Springer
 - The Rise of Digital Reading Markov Functional Interest Rate Models Springer
 - Advantages of eBooks Over Traditional Books
2. Identifying Markov Functional Interest Rate Models Springer
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Markov Functional Interest Rate Models Springer
 - User-Friendly Interface
4. Exploring eBook Recommendations from Markov Functional Interest Rate Models Springer
 - Personalized Recommendations
 - Markov Functional Interest Rate Models Springer User Reviews and Ratings
 - Markov Functional Interest Rate Models Springer and Bestseller Lists
5. Accessing Markov Functional Interest Rate Models Springer Free and Paid eBooks
 - Markov Functional Interest Rate Models Springer Public Domain eBooks
 - Markov Functional Interest Rate Models Springer eBook Subscription Services
 - Markov Functional Interest Rate Models Springer Budget-Friendly Options

6. Navigating Markov Functional Interest Rate Models Springer eBook Formats
 - ePub, PDF, MOBI, and More
 - Markov Functional Interest Rate Models Springer Compatibility with Devices
 - Markov Functional Interest Rate Models Springer Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Markov Functional Interest Rate Models Springer
 - Highlighting and Note-Taking Markov Functional Interest Rate Models Springer
 - Interactive Elements Markov Functional Interest Rate Models Springer
8. Staying Engaged with Markov Functional Interest Rate Models Springer
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Markov Functional Interest Rate Models Springer
9. Balancing eBooks and Physical Books Markov Functional Interest Rate Models Springer
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Markov Functional Interest Rate Models Springer
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Markov Functional Interest Rate Models Springer
 - Setting Reading Goals Markov Functional Interest Rate Models Springer
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Markov Functional Interest Rate Models Springer
 - Fact-Checking eBook Content of Markov Functional Interest Rate Models Springer
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
 - Integration of Multimedia Elements

- Interactive and Gamified eBooks

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