



Semiparametric Modeling of Implied Volatility (Springer Finance)

By Matthias R. Fengler

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This book offers recent advances in the theory of implied volatility and refined semiparametric estimation strategies and dimension reduction methods for functional surfaces. The first part is devoted to smile-consistent pricing approaches. The second part covers estimation techniques that are natural candidates to meet the challenges in implied volatility surfaces. Empirical investigations, simulations, and pictures illustrate the concepts.

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Editorial Review

Review

From the reviews:

"This book brings together recent advances in the theory of implied volatility and refined semiparametric estimation strategies and dimension reduction methods for functional surfaces. The theory of implied and local volatility is presented. The smile-consistent modeling approaches are discussed in detail. ... This book is for readers with a preknowledge of stochastic processes and interest in financial derivatives, as for example plain vanilla or exotic options." (Klaus Ehemann, Zentralblatt MATH, Vol. 1084, 2006)

"The parameter that measures volatility has long caused many problems in financial modeling. ... Fengler has written a research monograph. ... Concepts are presented in detail, elegantly connecting the past and current research, mathematical presentation, and numerical output (graphics). ... The appendices serve primarily for presentation of proofs and some results from stochastic calculus. This book is suitable for researchers, graduate students, and finance professionals." (Ita Cirovic Donev, MathDL, March, 2006)

"This short book addresses one of the most ... fundamental questions in financial mathematics and derivatives trading, namely, volatility modeling and management. ... the author does a good job in presenting the local volatility models, their implementation, and the problem in using this approach for hedging. ... It is an admirable attempt at the daunting task of modeling the dynamics of the IVS." (Andrew Carter and Jean-Pierre Fouque, SIAM Review, Vol. 49 (1), 2007)

From the Back Cover

The implied volatility surface is a key financial variable for the pricing and the risk management of plain vanilla and exotic options portfolios alike. Consequently, statistical models of the implied volatility surface are of immediate importance in practice: they may appear as estimates of the current surface or as fully specified dynamic models describing its propagation through space and time.

This book fills a gap in the financial literature by bringing together both recent advances in the theory of implied volatility and refined semiparametric estimation strategies and dimension reduction methods for functional surfaces: the first part of the book is devoted to smile-consistent pricing approaches. The theory of implied and local volatility is presented concisely, and vital smile-consistent modeling approaches such as implied trees, mixture diffusion, or stochastic implied volatility models are discussed in detail. The second part of the book familiarizes the reader with estimation techniques that are natural candidates to meet the challenges in implied volatility modeling, such as the rich functional structure of observed implied volatility surfaces and the necessity for dimension reduction: non- and semiparametric smoothing techniques.

The book introduces Nadaraya-Watson, local polynomial and least squares kernel smoothing, and dimension reduction methods such as common principle components, functional principle components models and dynamic semiparametric factor models. Throughout, most methods are illustrated with empirical investigations, simulations and pictures.

About the Author

Matthias Fengler took his PhD in Finance at the Humboldt-Universität zu Berlin and is now a quantitative analyst at Sal. Oppenheim, Frankfurt.

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