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★ **Derivatives in financial markets with stochastic volatility.**
(English. English summary)

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The book is entirely devoted to a specific, but highly relevant and nontrivial, problem of pricing and hedging of derivative securities under the assumption that the so-called volatility of the price of the underlying process is random, rather than deterministic. Numerous attempts to extend the classic models of financial markets to the case of a stochastic volatility were made by several researchers in the nineties. It should thus be mentioned that the authors put the emphasis on a particular, though fairly general, method of dealing with uncertain volatility developed by themselves in a series of papers.

The book is organized as follows: Chapter 1 provides a brief overview of basic notions related to arbitrage pricing and hedging of derivative securities in the classic Black-Scholes options pricing model. Subsequently, in Chapter 2 the authors first justify the need for modelling volatility as a stochastic process. In particular, they discuss here the so-called volatility smile and they present various alternative approaches to this issue developed in the literature. Most of these traditional models are based on the diffusion-type specification of the dynamics of the process modelling volatility. They rightly point out that there is no canonical stochastic volatility model that is generally accepted, and the relevance of explicit formulas for particular models is not obvious. To overcome these drawbacks, they propose to combine the mean-reverting property of volatility with the concept of the intrinsic time scale, which is introduced and analyzed in Chapter 3. The main statistical tools used to estimate the rate of mean reversion of volatility from historical data are presented in Chapter 4. Chapters 5 and 6 discuss asymptotic methods related to the valuation of derivative securities in the present set-up, as well as the important issue of model calibration. In Chapter 7, the issue of hedging under market incompleteness by the stochastic volatility is briefly discussed. In Chapters 8 and 9, the case of exotic options and American contingent claims is examined, while various generalizations (in particular, the portfolio optimization problem) are discussed in Chapter 10. Finally, in Chapter 11 the authors show how to cover through their original approach the case of fixed-income securities.

Though the topic discussed in the book is conceptually rather

difficult, the book itself is highly readable. Since the book starts from scratch and the style is user friendly, it is in my opinion accessible to graduate students specializing in the field of financial mathematics and probability theory. *Marek Rutkowski* (PL-WASWT)