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| Nota di bibliografia    | Includes bibliographical references and index.  |
| Nota di contenuto       | Cover ; Half-Tile ; Title ; Contents; List of Figures; List of Tables; Preface; Acknowledgments; 1 Synopsis of Selected EnergyMarkets and Structures; 1.1 Challenges of modeling in energy markets; 1.1.1 High volatilities/jumps; 1.1.2 Small samples; 1.1.3 Structural change; 1.1.4 Physical/operational constraints; 1.2 Characteristic structured products; 1.2.1 Tolling arrangements; 1.2.2 Gas transport; 1.2.3 Gas storage; 1.2.4 Load serving; 1.3 Prelude to robust valuation; 2 Data Analysis and StatisticalIssues; 2.1 Stationary vs. non-stationary processes; 2.1.1 Concepts<br>2.1.2 Basic discrete time models: AR and VAR2.2 Variance scaling laws and volatilityaccumulation33; 2.2.1 The role of fundamentals and exogenous drivers; 2.2.2 Time scales and robust estimation; 2.2.3 Jumps and estimation issues; 2.2.4 Spot prices; 2.2.5 Forward prices; 2.2.6 Demand side: temperature; 2.2.7 Supply side: heat rates, |

spreads, and production structure; 2.3 A recap; 3 Valuation, Portfolios, and Optimization; 3.1 Optionality, hedging, and valuation; 3.1.1 Valuation as a portfolio construction problem; 3.1.2 Black Scholes as a paradigm; 3.1.3 Static vs. dynamic strategies; 3.1.4 More on dynamic hedging: rolling intrinsic; 3.1.5 Market resolution and liquidity; 3.1.6 Hedging miscellany: greeks, hedge costs, and discounting; 3.2 Incomplete markets and the minimal martingale measure; 3.2.1 Valuation and dynamic strategies; 3.2.2 Residual risk and portfolio analysis; 3.3 Stochastic optimization; 3.3.1 Stochastic dynamic programming and HJB; 3.3.2 Martingale duality; 3.4 Appendix; 3.4.1 Vega hedging and value drivers; 3.4.2 Value drivers and information conditioning; 4 Selected Case Studies; 4.1 Storage; 4.2 Tolling; 4.3 Appendix; 4.3.1 (Monthly) Spread option representation of storage; 4.3.2 Lower-bound tolling payoffs; 5 Analytical Techniques; 5.1 Change of measure techniques; 5.1.1 Review/main ideas; 5.1.2 Dimension reduction/computation facilitation/estimation robustness; 5.1.3 Max/min options; 5.1.4 Quintessential option pricing formula; 5.1.5 Symmetry results: Asian options; 5.2 Affine jump diffusions/characteristic function methods; 5.2.1 Levy processes; 5.2.2 Stochastic volatility; 5.2.3 Pseudo-unification: affine jump diffusions; 5.2.4 General results/contour integration; 5.2.5 Specific examples; 5.2.6 Application to change of measure; 5.2.7 Spot and implied forward models; 5.2.8 Fundamental drivers and exogeneity; 5.2.9 Minimal martingale applications; 5.3 Appendix; 5.3.1 More Asian option results; 5.3.2 Further change-of-measure applications; 6 Econometric Concepts; 6.1 Cointegration and mean reversion; 6.1.1 Basic ideas; 6.1.2 Granger causality; 6.1.3 Vector Error Correction Model (VECM); 6.1.4 Connection to scaling laws; 6.2 Stochastic filtering; 6.2.1 Basic concepts; 6.2.2 The Kalman filter and its extensions; 6.2.3 Heston vs. generalized autoregressive conditional heteroskedasticity (GARCH)

## Sommario/riassunto

Commodity markets present several challenges for quantitative modeling. These include high volatilities, small sample data sets, and physical, operational complexity. In addition, the set of traded products in commodity markets is more limited than in financial or equity markets, making value extraction through trading more difficult. These facts make it very easy for modeling efforts to run into serious problems, as many models are very sensitive to noise and hence can easily fail in practice. Modeling and Valuation of Energy Structures is a comprehensive guide to quantitative and statistical approaches that have been successfully employed in support of trading operations, reflecting the author's 17 years of experience as a front-office 'quant'. The major theme of the book is that simpler is usually better, a message that is drawn out through the reality of incomplete markets, small samples, and informational constraints. The necessary mathematical tools for understanding these issues are thoroughly developed, with many techniques (analytical, econometric, and numerical) collected in a single volume for the first time. A particular emphasis is placed on the central role that the underlying market resolution plays in valuation. Examples are provided to illustrate that robust, approximate valuations are to be preferred to overly ambitious attempts at detailed qualitative modeling.