**Benth, Fred Espen; Krühner, Paul**

**Derivatives pricing in energy markets: an infinite-dimensional approach.** (English)

Zbl 1347.60082
SIAM J. Financ. Math. 6, 825-869 (2015).

**MSC:**

60H30 Applications of stochastic analysis (to PDEs, etc.)
60H15 Stochastic partial differential equations (aspects of stochastic analysis)
60H10 Stochastic ordinary differential equations (aspects of stochastic analysis)
60G60 Random fields
60G51 Processes with independent increments; Lévy processes
91G20 Derivative securities (option pricing, hedging, etc.)
91G80 Financial applications of other theories



**Keywords:**

energy markets; Hilbert-valued stochastic processes; option pricing; hedging; forward curves; spread options

**Full Text:** DOI arXiv

**References:**

[1] A. Albert (1972), \textit{Regression and the Moore–Penrose Pseudoinverse}, Academic Press, New York. · Zbl 0253.62030

[2] S. Albeverio, V. Mandrekar, and B. Rüdiger (2009), \textit{Existence of mild solutions for stochastic differential equations and semilinear equations with non-Gaussian Lévy noise}, Stochastic Process. Appl., 119, pp. 835–863. · Zbl 1168.60014

[3] A. Andresen, S. Koekebakker, and S. Westgaard (2010), \textit{Modeling electricity forward prices using the multivariate normal inverse Gaussian distribution}, J. Energy Markets, 3, pp. 1–23.

[4] N. Audet, P. Heiskanen, J. Keppo, and I. Vehvilainen (2004), \textit{Modeling electricity forward curve dynamics in the Nordic market}, in Modelling Prices in Competitive Electricity Markets, D. Bunn, ed., John Wiley \& Sons, New York, pp. 251–265.

[5] O. E. Barndorff-Nielsen (1998), \textit{Processes of normal inverse Gaussian type}, Finance Stoch., 2, pp. 41–68. · Zbl 0894.90011

[6] O. E. Barndorff-Nielsen, F. E. Benth, and A. Veraart (2011), \textit{Ambit processes and stochastic partial differential equations}, in Advanced Mathematical Methods for Finance, G. Di Nunno and B. Ø ksendal, eds., Springer-Verlag, Berlin, pp. 35–74. · Zbl 1239.91188

[7] O. E. Barndorff-Nielsen, F. E. Benth, and A. Veraart (2014), \textit{Modelling electricity forward markets by ambit fields}, Adv. Applied Prob., 46, pp. 719–745. · Zbl 1304.91213

[8] O. E. Barndorff-Nielsen, F. E. Benth, and A. Veraart (2015), \textit{Cross-commodity modeling by multivariate ambit fields}, Commodities, Energy and Environmental Finance, Fields Institute Communications Series, R. Aid, M. Ludkovski, and R. Sircar, eds., Springer-Verlag, Berlin, pp. 109–148.

[9] A. Barth and F. E. Benth (2014), \textit{The forward dynamics in energy markets—Infinite dimensional modeling and simulation}, Stochastics, 86, pp. 932–966. · Zbl 1337.91086

[10] F. E. Benth, N. Lange, and T. A. Myklebust (2015), \textit{Pricing and hedging quanto options in energy markets}, J. Energy Markets, 8, pp. 1–35.

[11] F. E. Benth and J. Lempa (2014), \textit{Optimal portfolios in commodity markets}, Finance Stoch., 18, pp. 407–430. · Zbl 1305.91213

[12] F. E. Benth, J. Šaltytė Benth, and S. Koekebakker (2008), \textit{Stochastic Modelling of Electricity and Related Markets}, World Scientific, Singapore. · Zbl 1143.91002

[13] F. E. Benth and J. Šaltytė Benth (2013), \textit{Modelling and Pricing in Financial Markets for Weather Derivatives}, World Scientific, Singapore. · Zbl 1303.91004

[14] F. E. Benth, S. Koekebakker, and F. Ollmar (2007), \textit{Extracting and applying smooth forward curves from average-based commodity contracts with seasonal variation}, J. Derivatives, 15, pp. 52–66.

[15] F. E. Benth and P. Krühner (2014), \textit{Representation of infinite-dimensional forward price models in commodity markets}, Comm. Math. Statist., 2, pp. 47–106. · Zbl 1322.60100

[16] F. E. Benth and P. Krühner (2015), \textit{Subordination of Hilbert-space valued Lévy processes}, Stochastics, 87, pp. 458–476

[17] F. E. Benth and P. Krühner (2015), \textit{Approximation of forward curve models with arbitrage-free finite dimensional models}, in preparation.

[18] F. Black (1976), \textit{The pricing of commodity contracts}. J. Financial Econom., 3, pp. 307–327.

[19] M. Burger, B. Graeber, and G. Schindlmayr (2014), \textit{Managing Energy Risk}, 2nd ed., John Wiley \& Sons, New York.

[20] M. Caporin, J. Pres, and H. Torro (2012), \textit{Model based Monte Carlo pricing of energy and temperature quanto options}, Energy Econ., 34, pp. 1700–1712.

[21] R. Carmona and V. Durrleman (2003), \textit{Pricing and hedging spread options}, SIAM Rev., 45, pp. 627–685. · Zbl 1033.60069

[22] R. Carmona and M. Tehranchi (2006), \textit{Interest Rate Models: An Infinite Dimensional Analysis Perspective}. Springer-Verlag, Berlin. · Zbl 1124.91030

[23] P. Carr and D. B. Madan (1998), \textit{Option valuation using the fast Fourier transform}, J. Comput. Finance, 2, pp. 61–73.

[24] J. Conway (1990), \textit{A Course in Functional Analysis}, 2nd ed., Springer-Verlag, Berlin. · Zbl 0706.46003

[25] N. Cressie and C. K. Wikle (2011), \textit{Statistics for Spatio-Temporal Data}, John Wiley \& Sons, New York. · Zbl 1273.62017

[26] A. Eydeland and K. Wolyniec (2003), \textit{Energy and Power Risk Management}, John Wiley \& Sons, New York.

[27] D. Filipovic (2001), \textit{Consistency Problems for Heath–Jarrow–Morton Interest Rate Models}, Springer-Verlag, Berlin. · Zbl 1008.91038

[28] D. Frestad (2008), \textit{Common and unique factors influencing daily swap returns in the Nordic electricity market}, Energy Econ., 30, pp. 1081–1097.

[29] D. Frestad, F. E. Benth, and S. Koekebakker (2010), \textit{Modeling term structure dynamics in the Nordic electricity swap market}, Energy Journal, 21, pp. 53–86.

[30] H. Geman (2005), \textit{Commodities and Commodity Derivatives}, John Wiley \& Sons, New York.

[31] P. Glasserman (2004), \textit{Monte Carlo Methods in Financial Engineering}, Springer-Verlag, Berlin. · Zbl 1038.91045

[32] S. Koekebakker and F. Ollmar (2005), \textit{Forward curve dynamics in the Nordic electricity market}, Manag. Finance, 36, pp. 74–95.

[33] W. Margrabe (1978), \textit{The value of an option to exchange one asset for another}, J. Finance, 33, pp. 177–186.

[34] S. Peszat, and J. Zabczyk (2007), \textit{Stochastic Partial Differential Equations with Lévy Noise}, Cambridge University Press, Cambridge. · Zbl 1205.60122

[35] K. Sato (1999), \textit{Lévy Processes and Infinitely Divisible Distributions}, Cambridge University Press, Cambridge.

[36] E. S. Schwartz (1997), \textit{The stochastic behaviour of commodity prices: Implications for valuation and hedging}, J. Finance, pp. 923–973.

[37] S. Tappe (2012), \textit{Some refinements of existence results for SPDEs driven by Wiener processes and Poisson random measure}, Int. J. Stoch. Anal., 24. · Zbl 1263.60060