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# Regime Switching Lėvy模型下的局部风险最小套期保值策略

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# Locally Risk Minimizing Hedging Strategy Under a Regime Switching Lėvy Model

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- 摘要
- 参考文献
- 相关文章

全文: PDF (470 KB) HTML (1 KB) 输出: BibTeX | EndNote (RIS) 背景资料

摘要 本文假定风险资产的价格满足马尔可夫调制的几何Lė; vy过程，其中市场利率、风险资产的平均回报率、波动率以及跳跃强度和幅度都依赖于市场的经济状态，这些经济状态由一连续时间马尔可夫链描述. 由于该模型下的市场是不完备的，在本文中我们首先采用局部风险最小化方法获得了欧式未定权益的最优套期保值策略. 接着，本文给出了一个具体的例子，得到了马尔科夫调制的几何布朗运动模型下的最优套期保值策略的数值结果. 最后将该最优套期保值策略与Black-Scholes模型下Delta套期保值策略进行了比较，证实了不确定因素-马氏链的存在给风险管理者的投资决策带来了影响.

关键词： 机制转换 局部风险最小 Lėvy过程

Abstract： In this paper, we suppose that the risky asset follows a Markov-modulated Geometric Lėvy process, the market interest rate, the appreciation rate and the volatility rate of the risky asset, and the intensity and magnitude of the jump depend on the states of the economy which are described by a continuous-time Markov chain. Since the market which we considered is incomplete, we find an optimal hedging strategy for a European contingent claim by employing the local risk minimization method. Then we also provide an example and obtain the numerical result of an optimal risk hedging strategy for a European call option under a Markov-modulated Geometry Brownian motion. Finally, this optimal risk hedging strategy and the Delta hedging strategy under the Black-Scholes model are compared in this paper, and prove that the uncertain factors of Markov chain will bring the impact on the investment decision of risk manager.

Key words： regime switching local risk minimization Lėvy process

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[1] Baranyai Z. On the Factorizitions of the Complete Uniform Hypergraph, Finite and Infinite Sets. Colloq. Math. Soc., Janos Bolyai, North-Holland, Amsterdam, 1975, 10: 91-108

[2] Schweizer M. Hedging of Options in a General Semimartingale Model. ETH Zurich, 1988

[3] Colbourn C J, Dinitz J H. The CRC Handbook of Combinatorial Designs. Boca Raton: CRC Press, Inc., 2006

[4] Schweizer M. Option Hedging for Semimartingales. *Stochastics Processes and Their Applications*, 1991, 37: 339-363

[5] Riesner M. Hedging Life Insurance Contracts in a Lévy Process Financial Market. *Insurance: Mathematics and Economics*, 2006, 599-608

[6] Lu J X. On Large Sets of Disjoint Steiner Triple Systems I-I!I!I. *J. Combin. Theory* (Ser. A), 1983, 34: 140-182

[7] Riesner M. Locally Risk Minimizing Hedging of Insurance Payment Streams. *Astin Bulletin*, 2007, 37: 67-91

[8] Lu J X. On Large Sets of Disjoint Steiner Triple Systems I!V-V!I. *J. Combin. Theory* (Ser. A), 1984, 37: 136-192

[9] Vandaele N, Vanmaele M. Locally Risk Minimizing Hedging Strategy for Unit-linked Life Insurance Contracts in a Lévy Process Fina Market. *Insurance: Mathematics and Economics*, 2008, 42: 1128-1137

[10] Chan T. Pricing Contingent Claims on Stocks Driven by Lévy Processes. *The Annals of Applied Probability*, 1999, 9(2): 504-528

[11] Teirlinck L. A Completion of Lu's Determination of the Spectrum for Large Sets of Disjoint Steiner Triple Systems. *J. Combin. Theo* (Ser. A), 1991, 57: 302-305

[12] Deshpande A, Ghosh M K. Risk Minimizing Option Pricing in a Regime Switching Market. *Stochastic Analysis and Applications*, 2008 313-324

[13] Kang Q D, Zhang Y F. Large Set of $P_3$-decompositions. *J. Combin. Des.*, 2002, 10: 151-159

[14] Sato K. Lévy Processes and Infinitely Divisible Distributions. Cambridge: Cambridge University Press, 1999

[15] Kang Q D, Zhao H T. Large Sets of Hamilton Cycle Decompositions of Complete Bipartite Graphs. *European J. Combin.*, 2008, 29: 1492-1501

[16] Ghosh M K., Arapostathis A, Marcus S I. Ergodic Control of Switching Diffusions. *SIAM Journal of Control and Optimization*, 1997, 1952-1988

[17] Zhang Y F. On Large Sets of P_k-decompositions. *J. Combin. Des.*, 2005, 13: 462-465

[18] Zhao H T, Kang Q D. Large Sets of Hamilton Cycle and Path Decompositions of Complete Bipartite Graphs. *Graphs Combin.*, 2013, 145-155

[19] Schweizer M. A Guided Tour Through Quadratic Hedging Approaches. Handbooks in Mathematical Finance: Option Pricing, Interes Rates and Risk Management, 2001, 538-574

[20] Zhao H T, Fan F F. Large Sets of $P_3$-decompositions of Complete Multipartite Graphs. *Ars Combin.*, 2012, 104: 341-352

[21] Elliott R J, han L L, Siu T K. Option Pricing and Esscher Transform Under Regime Switching. *Annals of Finance*, 2005, 1(4): 423-43

[22] Hao *G* H. Large Sets of K_{2, 2-decomposition of Complete Bipartite Graphs. *Ars Combin.*, 2012, 107: 354-360

[23] Siu T K, Yang H L, Lau J W. Pricing Currency Options Under Two-factor Markov-modulated Stochastic Volatility Models. *Insuranc Mathematics and Economics*, 2008, 43: 295-302