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On pricing derivatives under GARCH models: a dynamic Gerber-Shiu approach. (English)

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Summary: This paper proposes a method for pricing derivatives under the generalized autoregressive conditional heteroskedasticity (GARCH) assumption for underlying assets in the context of a "dynamic" version of Gerber and Shiu's (1994) option-pricing model. Instead of adopting the notion of a local risk-neutral valuation relationship (LRNVR), introduced by Duan (1995), the authors here employ the concept of conditional Esscher transforms introduced by Bühlmann et al. (1996) to identify a martingale measure under the incomplete market setting. One advantage of this model is that it provides a unified and convenient approach to deal with different parametric models for the innovation of the GARCH stock-price process. Under the conditional normality assumption for stock innovation, our pricing result is consistent with that of Duan (1995). In line with the celebrated Gerber-Shiu option pricing model, the pricing result can be justified within the dynamic framework of utility maximization problems, which makes the economic intuition of the pricing result more appealing. In fact, the use of the Esscher transform for option valuation can also be justified by the minimization of the relative entropy between the statistical probability and the risk-neutralized pricing probability. Numerical results for comparing the model with the Black-Scholes optionpricing model are also present.

MSC:

91B30 Risk theory, insurance (MSC2010)

62P05 Applications of statistics to actuarial sciences and financial mathematics

91B84 Economic time series analysis

Cited in **1** Review

Cited in **25** Documents

Software:

FinTS