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Dynamic programming approach for valuing options in the GARCH model. (English)

Summary: We develop an efficient algorithm to value options under discrete-time GARCH processes. We propose a procedure based on dynamic programming coupled with piecewise polynomial approximation to compute the value of a given option, at all observation dates and levels of the state vector. The method can be used for the large GARCH family of models based on Gaussian innovations and may accommodate all low-dimensional European as well as American derivatives. Numerical implementations show that this method competes very advantageously with other available valuation methods.

MSC:
91G20 Derivative securities (option pricing, hedging, etc.)
91G80 Financial applications of other theories
90C39 Dynamic programming

Keywords:
dynamic programming; finance asset pricing; Markov infinite state

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