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A lattice method for option evaluation with regime-switching asset correlation structure. (English) Zbl 07394162
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Summary: This paper develops a lattice method for option evaluation in the presence of regime shifts in the correlation structure of assets, aiming at investigating whether the option prices reflect such shifts. We try to investigate whether option prices reflect switches in the correlation between the underlying asset of an option and risk-free rates. We develop and test two models. In the first model we allow all the parameters to follow a regime-switching process while in the second model, in order to isolate the regime-switching correlation effect on the option prices, we allow only the correlation to follow a regime-switching process. We use pentanomial lattices to represent the evolution of the regime-switching underlying assets. This is then applied in our empirical analysis, which focuses on crude oil. We use grid- and patternsearch based techniques to fit our models. Our findings suggest that prices of market traded options reflect the regime-switches and that a model which considers these switches produces significantly more accurate results than a single-regime model. We demonstrate that there is an asymmetry between parameter values obtained from historical data (backward looking) and those that are implied by traded options (for- ward looking) by employing the Kim filter to estimate our model.

MSC:
58F15 Hyperbolic structures (expanding maps, Anosov systems, etc.) (MSC2000)
58F17 Geodesic and horocycle flows (MSC2000)
53C35 Differential geometry of symmetric spaces

Keywords:
option evaluation; lattice method; regime-switching; correlation switching; transition probabilities

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References:


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