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Some contributions to sequential Monte Carlo methods for option pricing

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densities over time. In particular, we approximate the optimal importance sampling distribution in the SMC algorithm by using a sequence of weighting functions. This is demonstrated on two examples, barrier options and target accrual redemption notes (TARNs). We also provide a proof of unbiasedness of our SMC estimate.

Q KEYWORDS: Diffusions sequential Monte Carlo option pricing

Q AMS SUBJECT CLASSIFICATION: 91G60 (primary) 65C05 (secondary)

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes

1. We have a slight abuse of notation in the above, wherein we have used $\mu(n, S_n)$ and $\sigma(n, s_n)$ to denote $\mu(t_n, R_{t_n})$ and $\sigma(t_n, R_{t_n})$ respectively.

2. If μ is a constant other than 0, then it is trivial to extend the methods we propose. If it is a function of S , then it is a function of S in the local volatility model.

3. We have assumed that μ is a constant. If μ is a function of S , then there would be a drift term in the SDE and this would affect the variance of the estimator.

4. Path dependent options are more difficult to price than vanilla options. The simulation of paths is more difficult and the Monte Carlo estimates are more unreliable.



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