tr_bbsr

Input parameters:

- StepNumber N

Output parameters:

- Price

- Delta

This is taken from [2] The ideas of this algorithm is to replace the last time step of the binomial tree by the Black-Scholes formula. This will smooth the terminal payoff so that one may hope an enhanced convergence. This may be called BBS(Binomial Black-Sholes) algorithm. The additional feature of this algorithm is to perform a Richardson extrapolation, whence the name BBSR.

/*Memory Allocation: Price, Intrinsic Value arrays*/

/*Up and Down factors*/

/*Risk-Neutral Probability*/
This is Hull-White binomial probability for which the local consistency condition is easily checked (cf. [1])

/*Intrinsic Value computation*/
Storage of the $2N + 1$ possible values of the intrinsic value.

/*Backward Resolution*/
Note that we don't re-compute the intrinsic value.

/*LastTime Step*/
The continuation value is done by Black-Scholes formula.

/*Delta*/

The delta here is the right hedging delta in the binomial model (cf The Generalized CRR model). There may be a more clever way to approximate the continuous-time Black&Scholes delta.

/*First time step*/

/*Price*/

/*Desallocation*/

References

[1] J.HULL A.WHITE. The use of the control variate technique in option pricing. *J.Of Finance and Quantitative Analysis*, 23:237–251, 1988. 1

[2] M.BROADIE J.DETEMPLE. American option valuation : new bounds, approximations and a comparison of existing methods. *Review of financial studies, to appear*, 1995. 1