

Source		Model		Option Family
	Model_Option		Archived Dyn Tests	

## bs1d\_std\_testpatry

In this routine, we simulate the best stopping times when the number of hedge is fixed. We simulate the spot in the CRR model. We must use the function tr\_patry.c.

```

/* Variables needed for graphic outputs */
stock_array, pl_array, hedge_time, hedge_spot and delta_array are arrays
of double which contain respectively the values of the stock, the P&L time
after time, the values of the dates of hedge, the values of the corresponding
spot and the delta.

/***** Initialization of the test's parameters *****/
path_number: number of the different simulated stock's trajectories.
hedge_number: number of hedge.
step_number: number of possible dates of hedging.
step_hedge:  $h = \frac{\text{Maturity-current\_date}}{\text{step\_number}}$ , period of time between two dates of
possible trading.
cash_rate= $e^{rh}$ , interest rate yielded by the bank account over the period
of time h.
stock_rate= $e^{\text{divid} \cdot h} - 1$ , dividends rate yielded by owning the stock account.
sigma*sqrt(h)= $\sigma\sqrt{h}$ .
/*Up and Down factors*/
/*Risk-Neutral Probability*/

/* Graphic outputs initializations and dynamical memory allo-
cutions */
We allocate dynamically some arrays to keep in the values needed for
graphic outputs : stock's and P&L's trajectories, the dates of trading and
the corresponding spot, and the delta.

/***** Trajectories of the stock *****/

```

In this loop, we simulate *path\_number* different stock's trajectories and for each we calculate the corresponding P&L.

**/\* Calculating selling\_price and delta \*/**

We send informations like the current date and the option's type to the chosen method, and this last gives us the corresponding selling price and delta at initial time. We suppose that the market maker hedges at the initial time.

**/\* Calculating cash\_account and stock\_account \*/**

With the selling price and the delta given before, we determine the first cash account :  $cash\_account = selling\_price - delta * stock$ . And the stock account equals  $delta * stock$ , in fact delta is the quantity of stock owned by the Market Maker.

**/\*\*\*\*\*\* Dynamic Hedge \*\*\*\*\*/**

This loop calculates the amount of money at current time out of a cash amount *selling\_price* and a sequence of buying/selling (hedging) of the underlying asset between time *initial\_time* and current time, with no option deals any longer between these two dates. It gives also the dates of trading (hedge\_now=0 means it is optimal to hedge).

**/\* Capitalization of cash\_account and yielding dividends \*/**

The cash\_account is capitalized at the rate *cash\_rate* defined before and dividends are yielded with the rate *stock\_rate* defined before.

**/\* Calculating the new stock's value \*/**

At each step of the loop we simulate the stock's value given by the CRR model.

**/\* Calculating the new selling\_price and the new delta \*/**

The same as before. If hedge\_now=0, it is optimal to hedge.

**/\* Calculating the new cash\_account and the new stock\_account \*/**

$new\_cash\_account = old\_cash\_account - (new\_delta - old\_delta) * stock$ .

**/\*\*\*\*\*\* Last Hedge \*\*\*\*\*/**

That's the last step in the hedge process. Here, rather than using the selling\_price, we simply use the pay-off known since the beginning : so we avoid all numerical problem of the last step of the loop for the reason that we are, at this time, nearby the maturity date and some numerical methods may cause a problem here.

**/\* Capitalization of cash\_account and yielding dividends \*/**

The same as before.

**/\* Calculating the last stock's value \*/**

The same as before.

**/\* Capitalization of cash\_account and calculating the P&L using the PayOff \*/**

**/\* Selection of trajectories (Spot and P&L) for graphic outputs \*/**

Here we select different noteworthy spot's trajectories : we keep stock's trajectories generating the minimal, the maximal and the average P&L. The aim is to display them to observe the behavior of the used pricing method in extrem situations. We keep also the dates of hedging, the corresponding spot and the delta for these extrem trajectories.