

fd_fixedpoint

Input parameters:

- TimeStepNumber N
- SpaceStepNumber I

Output parameters:

- Price
- Delta

We use a finite difference method to solve the pricing of an American put. We use a finite difference Crank-Nicholson scheme coupled, within each timestep, with an iterative algorithm to locate the free boundary. This method is inspired from [1].

The main features of the algorithm we use are:

- we use a finite difference scheme in space,
- we use a Crank-Nicholson time-stepping scheme,
- within each timestep, we move the boundary, according to the inequalities which must be verified by the solution,
- the linear system is tridiagonal and solved with Crout's method.

References

- [1] Y. Achdou and O. Pironneau. A numerical procedure for the calibration of volatility with American options. *Applied Mathematical Finance*, 12(3), 2005. [1](#)