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Assignment - Finite difference methods to price European Options

Assignment

- Write MATLAB-program to price European call options under CEV-model:
$$\frac{\partial v}{\partial t} + rs\frac{\partial v}{\partial s} + \frac{1}{2}\sigma^2 s^{2\gamma}\frac{\partial^2 v}{\partial s^2} - rv = 0,$$
$$v(T, s) = \Phi(s).$$
- Make relevant and interesting experiments.
- Report program code, interesting plots etc.

The experiments shall (at least) reflect accuracy aspects, stability and how the solution varies with γ. Some examples on how these can be interpreted:

Accuracy: how does the error converge with respect to Δt and Δs

Stability: the explicit solver is unstable for some combinations of Δt and Δs, numerically, at what limit does the solver become unstable?

Complexity: make some comparisons between the explicit and implicit solver with respect to complexity.

on γ : how does the computed price change when you change γ?

As an example you can use the following parameters: $K = 15$, $r = 0.1$, $\sigma = 0.25$, $T = 0.5$, $\gamma = 0.8$. Note that in order to use bsexact.m you need to compare the results with your computations using $\gamma = 1$.

You have the opportunity to have tutoring approx. 10 min/group. Book a time slot in the doodle (https://doodle.com/bp/filipmarttala/assignment-2-tutorial). Your results should be handed in through the student portal no later than 14/9.

During 14-16/9 there will be a questionnaire open in the student portal that you all have to answer individually.

Good luck!