

A project on European compound options

A compound option is an option on a option. For example, given $K_{\text{call}}, K_{\text{put}} > 0$ and $T_{\text{call}} > T_{\text{put}} > 0$, let $\mathcal{U}$ be the call option on a stock with strike K_{call} and maturity T_{call} . The put on $\mathcal{U}$ with maturity T_{put} and strike K_{put} gives the right to sell the call $\mathcal{U}$ for the price K_{put} at time T_{put} . All options in this project are assumed to be European.

The main goal of this project is to perform a parameter sensitivity analysis of the put on the call using the binomial model and Matlab. In particular:

- Study numerically how the value at time $t = 0$ of the put on the call depends on $K_{\text{put}}, K_{\text{call}}$ and $T_{\text{put}}, T_{\text{call}}$.
- Study numerically how the value at time $t = 0$ of the put on the call depends on the risk-free rate, the value of the stock at time $t = 0$ and the volatility of the stock.
- Give an intuitive explanation for the parameter sensitivity behavior found numerically.

The results of the project have to be outlined in a report consisting of three sections:

- The first section is the Introduction (1-2 pages). Here is where you state the problem, describe the theoretical framework and discuss the financial applications.
- The second section is where you report on the goals of the project (3-4 pages).
- The third section is the Conclusion. Summarize your most interesting results in this section (1 page).

Remarks:

- The report has to be submitted in PDF form by e-mail to calogero@chalmers.se. Use OPTIONS 2020 as subject and include all members of the group as recipients. Attach your Matlab codes to the e-mail (preferably in a ZIP file).
- The deadline for submission is **January 3rd, 2020**. The grade on the project (max 2 bonus points) will be communicated on Tuesday January 7th.
- For help on the project you can pass to my office (L2036) during my office hours (Tuesday 13.30-15, Friday 13.30-15). Further assistance will be provided in the lecture on December 18th (bring your laptop!). This lecture will take place in the room MVF33 and *not* in the usual room (Pascal).