

Homework 3: pricing of standard and barrier options on a stock

When implementing the options below, you can assume that all the barrier and exercise times are strictly greater than the initial time. The issue time coincides with the initial time.

Straddle option

K : strike price

T : maturity

The straddle option is the sum of the standard european put and call options with the same strike and maturity.

American call on forward

F : forward price.

T : time to maturity of forward contract as year fraction.

$(t_i)_{1 \leq i \leq N}$: exercise times.

A holder of the option can exercise it at any time t_i . In this case, he will enter a long position in the forward contract with forward price F and maturity $t_i + T$.

Down-and-rebate option

N : notional

L : lower barrier

$(t_i)_{1 \leq i \leq N}$: barrier times

The option pays notional at the first barrier time when the spot price is below lower barrier L . Otherwise, the option expires worthless.

Up-and-in american put

U : upper barrier

$(t_i)_{1 \leq i \leq M}$: barrier times

K : strike

$(u_i)_{1 \leq i \leq N}$: exercise times ($u_1 > t_1, u_N > t_M$).

The option becomes american put option (with the given set of exercise times) after the first barrier time when the stock price is above upper barrier U . If the price of the stock stays below U for all barrier times, then the option expires worthless.