Examples for "Financial Derivatives with C++"

Dmitry Kramkov
Carnegie Mellon University

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Contents

The issue time for all options coincides with the initial time. The maturities, barrier, and exercise times are strictly greater than the initial time.

Standard put

K : the strike.

T : the maturity.

The payoff of the option at the maturity is given by

$$V(T) = \max(K - S(T), 0),$$

where $S(T)$ is the price of the stock at T.

Call on forward price

K : the strike.

T : the maturity of the call option.

U : the delivery time of the forward contract.

The payoff of the option at the maturity is given by

$$X(T) = \max(F(T,U) - K, 0),$$

where $F(T,U)$ is the forward price computed at T for delivery at U.

Clique option

T : the maturity.

$(t_m)_{m=1,\ldots,M}$: the averaging times, $t_M < T$.

K : the strike.

The payoff of the option at maturity is given by

$$V(T) = \frac{1}{M} \sum_{m=1}^{M} \max(S(t_m) - K, 0),$$

where $S(t)$ is the spot price at t.

American put

K : the strike.

$(t_m)_{m=1,\ldots,M}$: the exercise times.

A holder of the option can exercise it at any time t_m. In this case, he receives intrinsic value

$$V(t_m) = \max(K - S(t_m), 0),$$

where $S(t_m)$ is the price of the stock at time t_m.

American call on forward

K : the forward price.

δt : the time to maturity of the forward contract as an year fraction.

$(t_m)_{m=1,\dots,M}$: the exercise times.

The option can be exercised at any time t_m. In this case, its holder enters a long position in the forward contract with forward price K and maturity $t_m + \delta t$.

Swing option

K : the strike.

$(t_n)_{n=1,\dots,N}$: the exercise times.

M : the maximal number of exercises, $M \leq N$.

A holder of the option is given the right to purchase M stocks at price K per share. The transactions take place at exercise times. Only *one* stock can be bought at a particular exercise time, that is, to get n stocks the holder should use n *different* exercise times. Such options are actively traded on energy markets.

Barrier up-or-down-and-out option

U : the upper barrier.

L : the lower barrier.

$(t_m)_{m=1,\dots,M}$: the barrier times.

N : the notional.

The payoff of the option at maturity (last barrier time t_M) is given by notional amount N if the stock price stays between the lower and upper barriers for all barrier times. Otherwise, the option expires worthless.

Down-and-out american call

L : the lower barrier.

$(u_i)_{i=1,\dots,N_1}$: the barrier times.

K : the strike.

$(v_i)_{i=1,\dots,N_2}$: the exercise times, $v_{N_2} > u_{N_1}$.

The option behaves as the american call option with strike K and exercise times (v_i) until the first barrier time when the stock price hits lower barrier L. At this exit time the option is canceled.