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Statistics C183/C283

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Options - general notes

Some general notes on options.

1. Call options are exercised when the stock price at expiration is larger than the exercise price.
2. Put options are exercised when the stock price at expiration is smaller than the exercise price.
3. Parameters affecting option prices. Suppose the parameters listed next increase.

Parameter	European call	European put	American call	American put
Stock price S_0	up	down	up	down
Exercise price E	down	up	down	up
Volatility σ	up	up	up	up
Dividends paid	down	up	down	up
Interest rate	down	up	down	up

4. It is never optimal to exercise early an American call when the stock does not pay dividends.

We have seen that the lower bound for a European call is $c \geq S_0 - Ee^{-rt}$. The same holds for an American call, $C \geq S_0 - Ee^{-rt}$. If at a certain point in time before expiration $S > E$ there is an opportunity for early exercise to make a profit of $S - E$. For example if $E = \$50$ and $S = \$60$ we can make a profit of \$10. However, looking at the lower bound we see that since $r > 0$ it follows that $C > S - E$, therefore it is better not to exercise the American call option early.

5. It can be optimal to exercise an American put early when the stock does not pay dividends for a sufficiently low stock price.