Test Your Knowledge
Options, Pricing and Risk Management
Q&A
Series 1

Test Your Knowledge

We summarize in this document the results of a series of questions posted on LinkedIn to test knowledge on Options, Pricing and Risk Management.

We provide the correct answers, which are, as you will see, not always in line with the majority of the votes!

Question 1


What is the rate of convergence of traditional Monte Carlo simulations?
You can see how people vote. Learn more
1/√n
80%
1/n
7%
1/n^2
6%
log(n)/n
8%
309 votes • Poll closed

Question 1

What is the rate of convergence of traditional Monte Carlo simulations?

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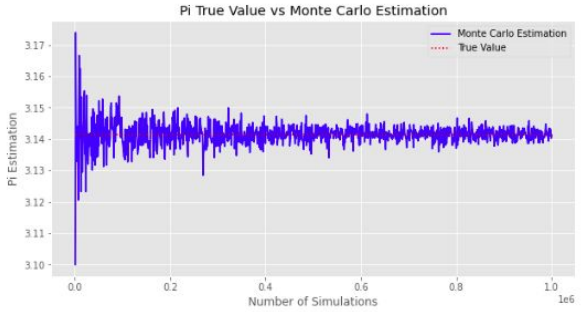
1/√n	80%
1/n	7%
1/n^2	6%
log(n)/n	8%

309 votes • Poll closed

Answer

The rate of convergence of traditional Monte Carlo simulations is in O(1/√n) (Central Limit Theorem).

The Monte Carlo simulation is quite slow, it means that 100 times more simulations are required to improve by a factor 10 the accuracy of the estimate.



Question 2


Which of the following finite difference schemes can be unstable?
You can see how people vote. Learn more
Implicit
14%
Explicit
43%
Crank-Nicolson
10%
All of the above
33%
79 votes • Poll closed

Question 2

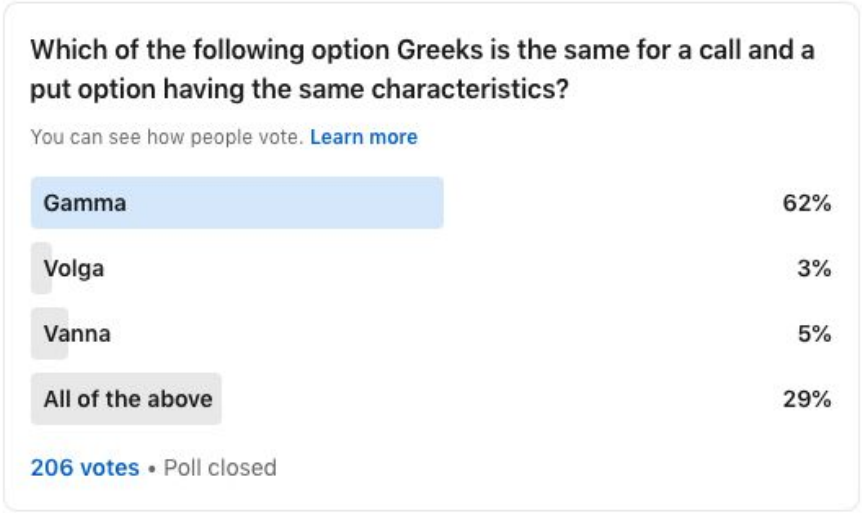
Answer

The explicit finite difference scheme can be unstable when the number of time steps (n) in the scheme is not high enough. There is a square relationship between the minimum number of time steps and the stock price discretization (m) (Von Neumann stability analysis).

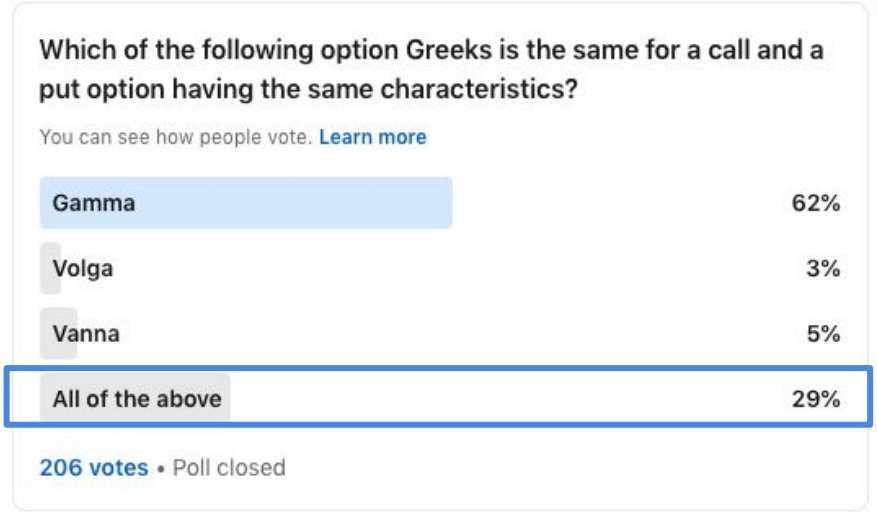
$$n \geq T \cdot \sigma^2 \cdot m^2$$

The two other methods implicit and Crank-Nicolson are stable ones.

Question 3


Which of the following option Greeks is the same for a call and a put option having the same characteristics?
You can see how people vote. Learn more
Gamma
62%
Volga
3%
Vanna
5%
All of the above
29%
206 votes • Poll closed

Question 3



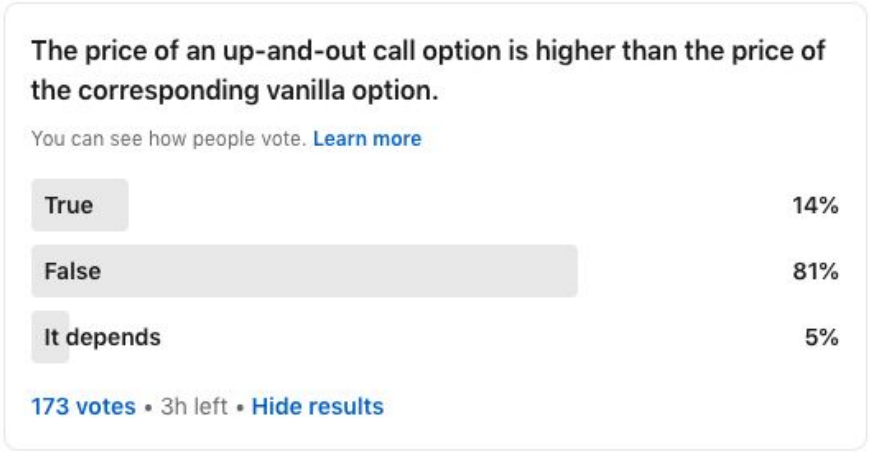
Answer

The Gamma, but also the Volga and the Vanna are the same for a call and a put option having the same characteristics (issuer, time to maturity T, strike price K).

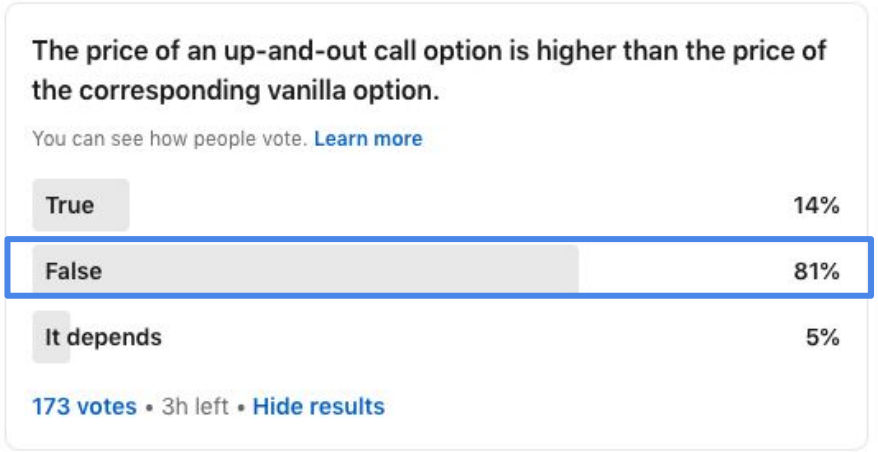
Indeed by the call-put parity we know that the difference between the call price (C) and put price (P) is linear in the stock price S, it has no convexity and is not depending on the implied volatility.

It means that for C - P the gamma (second derivative of the option price with respect to S), the vega (derivative with respect to implied volatility sigma), the volga (second derivative with respect to sigma) or the vanna (derivative of the vega with respect to S) are all equal to zero.

Question 4


The price of an up-and-out call option is higher than the price of the corresponding vanilla option.
You can see how people vote. Learn more
True
14%
False
81%
It depends
5%
173 votes • 3h left • Hide results

Question 4



Answer

Barrier options are always cheaper than similar options without the barrier.

Typically, an up-and-out call option is cheaper than a similar call option without the barrier because it has a chance of being knocked out if the underlying asset price exceeds the barrier level.

Question 5

Which of the following equation is true (no dividend).
C, P, S, K: call, put, asset, strike prices, r: risk-free rate, T: time to maturity

You can see how people vote. Learn more

C - P = S - K x e^(-r x T)	87%
C + P = S - K x e^(-r x T)	4%
C - P = S + K x e^(-r x T)	6%
C - P = S x e^(-r x T)+ K	2%

454 votes • Poll closed

Question 5

Which of the following equation is true (no dividend).
C, P, S, K: call, put, asset, strike prices, r: risk-free rate, T: time to maturity

You can see how people vote. Learn more

C - P = S - K x e^(-r x T)	87%
C + P = S - K x e^(-r x T)	4%
C - P = S + K x e^(-r x T)	6%
C - P = S x e^(-r x T) + K	2%

454 votes • Poll closed

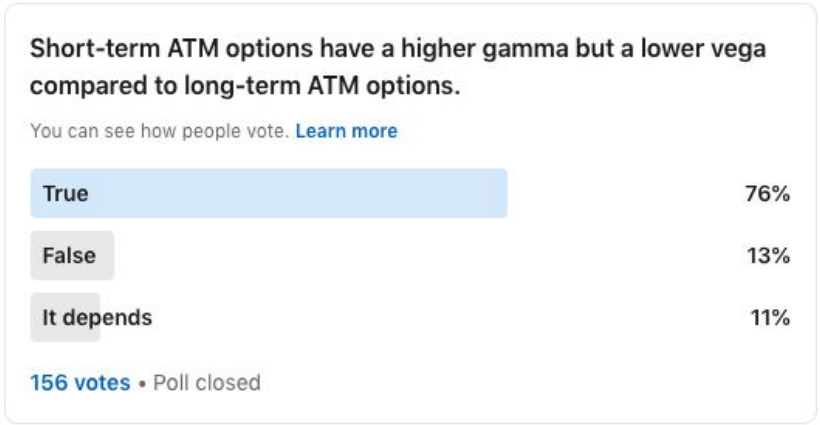
Answer

When there is no dividend, and in the absence of arbitrage opportunity, we have the following relationship between the price of a call and a put on the same underlying asset having the same time to maturity and strike price.

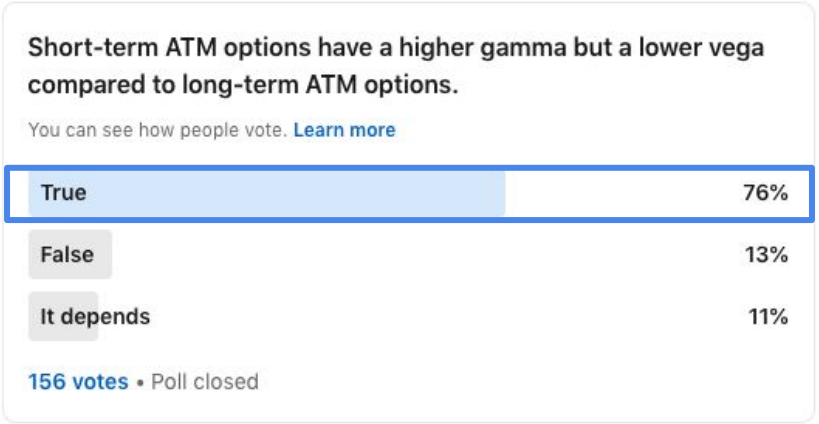
This is the call-put parity:

$$C - P = S - K \cdot e^{-r.T}$$

Question 6


Short-term ATM options have a higher gamma but a lower vega compared to long-term ATM options.
You can see how people vote. Learn more
True
76%
False
13%
It depends
11%
156 votes • Poll closed

Question 6



Answer

Short-term ATM options have higher gamma but a lower vega compared to long-term ATM options.

The gamma increases when the option get closer to expiration and it ATM, the gamma measures the instability of the delta, which is maximum when the option is at-the-money and approaches expiry.

The Vega increases with time to maturity. It makes sense as the standard deviation of price returns is proportional to the square root of time, so the longer the option has until it expires, the more its price will be affected by volatility.

Question 7

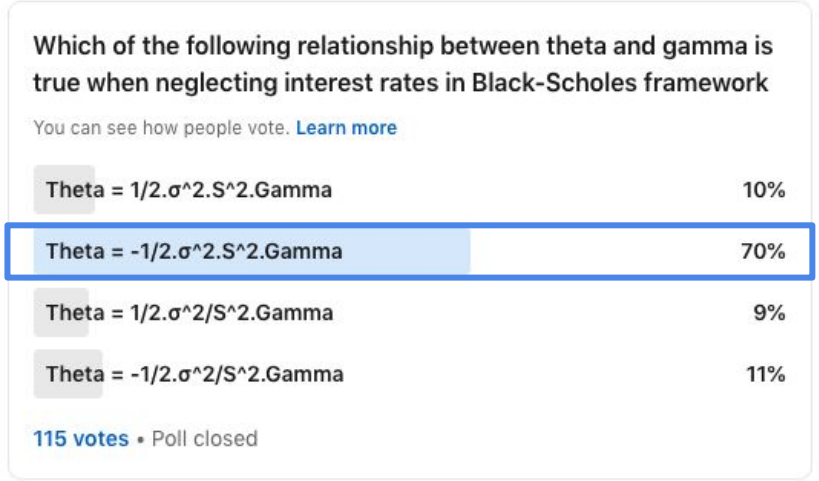
Which of the following relationship between theta and gamma is true when neglecting interest rates in Black-Scholes framework

You can see how people vote. Learn more

Theta = 1/2.σ^2.S^2.Gamma	10%
Theta = -1/2.σ^2.S^2.Gamma	70%
Theta = 1/2.σ^2/S^2.Gamma	9%
Theta = -1/2.σ^2/S^2.Gamma	11%

115 votes • Poll closed

Question 7



Answer

From the Black-Scholes equation we get, when neglecting interest rates, the following relationship between theta Θ and Gamma Γ.

Call and put options have a positive convexity (positive gamma) but it has a cost (negative theta). Theta is the cost for the positive gamma of the option.

$$\Theta = -\frac{1}{2} \cdot \sigma^2 \cdot S^2 \cdot \Gamma$$

Question 8


What is the rate of convergence of quasi-Monte Carlo method in dimension 1?
You can see how people vote. Learn more
O(log(N)/N)
21%
O(1/N^0.5)
54%
O(1/N)
20%
O(log(N)/N^2)
5%
135 votes • Poll closed

Question 8

What is the rate of convergence of quasi-Monte Carlo method in dimension 1?

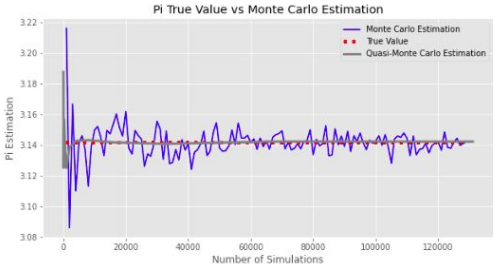
You can see how people vote. Learn more

O(log(N)/N)	21%
O(1/N^0.5)	54%
O(1/N)	20%
O(log(N)/N^2)	5%

135 votes • Poll closed

Answer

Quasi-Monte Carlo simulations are variations of Monte Carlo simulations. It uses low-discrepancy deterministic sequences with better uniformity properties than purely random sequences providing more accurate and efficient estimates compared to traditional Monte Carlo simulations. The rate of convergence is close to $O(\log(N)^k / N)$ for a problem of dimension k compared to $O(1/\sqrt{n})$ with traditional Monte Carlo simulations.



Question 9

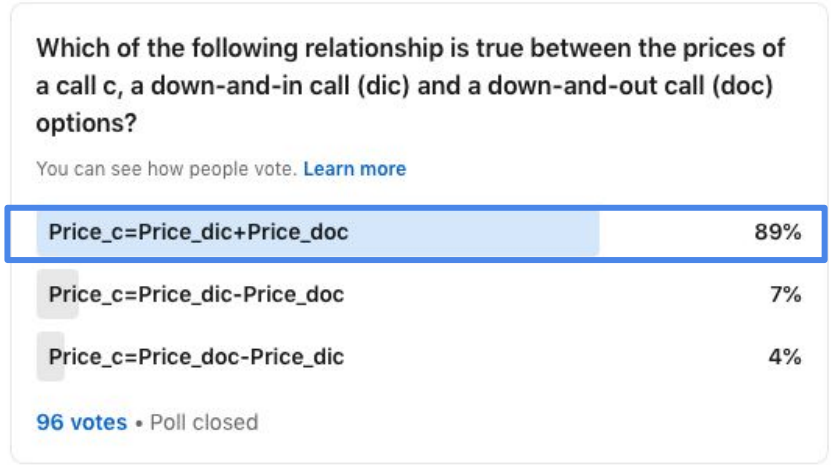
Which of the following relationship is true between the prices of a call c, a down-and-in call (dic) and a down-and-out call (doc) options?

You can see how people vote. Learn more

Price_c=Price_dic+Price_doc	89%
Price_c=Price_dic-Price_doc	7%
Price_c=Price_doc-Price_dic	4%

96 votes • Poll closed

Question 9



Answer

When comparing a down-and-in and a down-and-out with the corresponding call option, the option is either activated or deactivated, and the price of a vanilla call option is equal to the sum of the prices of a down-and-in and down-and-out calls.

This is the in-out parity relationship.

$$Price_{call} = Price_{\text{down-and-in-call}} + Price_{\text{down-and-out-call}}$$

Question 10


The gamma of a down-and-out put option is
You can see how people vote. Learn more
Positive
36%
Negative
21%
It depends
43%
128 votes • Poll closed

Question 10

The gamma of a down-and-out put option is

You can see how people vote. Learn more

Positive	36%
Negative	21%
It depends	43%

128 votes • Poll closed

Answer

the gamma of a down-and-out put option change signs, which makes it difficult to manage the gamma risk of the option.

It is positive when the stock price is far from the barrier level, the option is quite similar to a vanilla put option.

But when the stock price gets closer to the barrier level, it becomes more likely that the option may be deactivated and the gamma becomes negative, with very negative values when the option is close to expire.

S0 = 20…150,
K = 95,
B = 70,
r = 5%,
sigma = 30%,
T = 0.5, 0.1 and 0.01

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