

What is Option Pricing?

Worksheet

Option pricing uses formulas like Black-Scholes to determine the theoretical value of a call or put option based on the stock price, volatility, time remaining, strike price, and risk-free rate.

$$C = S_0 N(d_1) - K e^{(-rT)} N(d_2)$$

C = Call option price (currency)

S_0 = Current stock price (currency)

K = Strike price (currency)

r = Risk-free interest rate (% per year)

T = Time to expiration (years)

σ = Volatility (std dev) (% per year)

Questions

1. Stock 100, call strike 100. After 6 months, stock rises to \$120. Intrinsic value of call?

- A) \$0
- B) \$10
- C) \$20
- D) \$30

2. Higher volatility → option value?

- A) Stays same
- B) Decreases
- C) Increases
- D) Becomes zero

3. Call option with 1 day left vs 1 month left (same strike/stock)?

- A) 1-day is worth more
- B) 1-month is worth more
- C) Equal value
- D) Depends on strike

4. Black-Scholes model assumes...

- A) Stock price always rises
- B) No transaction costs/volatility constant
- C) Guaranteed profit
- D) Only puts

5. Stock price 100, strike 100, 1 year, volatility 20%, rate 5%. Estimate call value.

6. Stock 100, call strike 90 (in-the-money), 6 months, vol 30%, rate 5%. Value?

7. Same stock & call but only 1 week left ($T=0.02$ years). How does value change?

8. Define: What is option pricing?

9. Define: What factors affect option value?

10. Define: What is a call option?

Answer Key

1. C) \$20 — Intrinsic = $\max(\text{stock} - \text{strike}, 0) = \max(120 - 100, 0) = \20 .
2. C) Increases — Higher volatility = greater chance of large move → more valuable option.
3. B) 1-month is worth more — 1-month has more time value; longer time = more chance of profitable move.
4. B) No transaction costs/volatility constant — B-S is an idealized model; real markets have costs and changing volatility.
5. Using Black-Scholes (at-the-money): $d_1 \approx 0.55$, $d_2 \approx 0.35$, $N(d_1) \approx 0.71$, $N(d_2) \approx 0.64$ $C \approx 100(0.71) - 100 \cdot e^{(-0.05)} \cdot 0.64 \approx \10.45
6. ITM call is worth more; intrinsic value ≥ 10 . Black-Scholes with $\sigma=30\%$ (higher vol) $\approx 15-18$. Approx: \$16.
7. Shorter time → less time value → option worth less. With $T=0.02$: $C \approx \$10$ (mostly intrinsic, time value eroded).
8. Calculating the fair value of a call or put option using models like Black-Scholes.
9. Stock price, strike price, time to expiry, volatility, risk-free rate, and dividends.
10. The right (not obligation) to buy a stock at a set price (strike) by a date.

Bounlu

All cards, step-by-step solutions and an AI tutor are in the Notek app.
Promy turns exam dates into automatic reminders.