Advanced Finance - Cheatsheet

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Terminology

Derivatives: Any financial instrument that is derived from another e.g. options, warrants, futures, swaps
Option: gives the holder the right to buy or sell a security at a specified price during a specified time period
Call Option: The right to buy a security at a specified price within a specified time
Option Premium: The price paid for the option, above the price of the underlying security
Intrinsic Value: Difference between the strike price and the stock price
Time Premium: Value of option above the intrinsic value
Exercise Price: (Strike Price) The price at which you uby or sell the security
American Option: Can be exercised at any time prior to and including the expiration date
European Option: Can be exercised only on the expiration date
Exercise price ↑: **Call Price ↓**, **Put Price ↑**
Put Option: The right to sell a security at a specified price within a specified time
Butterfly
Straddle
Strategy of buying a call: Bild einfügen

Formulas

Put-Call-Parity

$$C + PV(EX) = P + S$$

where:

- C = Price of the European call option
- $PV(EX)$ = Present value of the strike price = $\frac{Ex.Price}{(1+r)}$
- P = Price of a European Put
- S = Share Price

Option Δ

$$Option\Delta = \frac{C_u - C_d}{S_u - S_d} = \frac{P_u - P_d}{S_u - S_d}$$

where:

- C_u = Call upside
- C_d = Call downside
- P = Put
- S = Stock

Risk neutral probability of rising value

$$p^* = \frac{(1+r) - d}{u - d}$$

where:

- r = Interest rate
- d = Relative downward change
- u = Relative upward change

Expected Value

$$ExpectedValue = (p^* * PayOff_u) + ([1 - p^*] * PayOff_d)$$

Present Value

$$PresentValue = \frac{ExpectedValue}{(1+r)} = ValueShares - ValueLoan$$

$$ValueLoan = \frac{ValueShares_d}{(1+r)}$$

Up and Down Changes

$$1 + UpsideChange = u = e^{\sigma * \sqrt{h}}$$

$$1 + DownsideChange = d = \frac{1}{u}$$

where:

- σ = Standard Deviation
- h = Fraction of Year

Black-Scholes Formula(weg wenn zu viel)

$$C = (N[d_1] * S) - (N[d_2] * PV[EX])$$

$$d_1 = \frac{log(\frac{S}{PV[EX]])}}{\sigma * \sqrt{t}} + \frac{\sigma\sqrt{2}}{2}$$

$$d_2 = d_1 - \sigma\sqrt{t}$$

where:

- C = Call Value
- $N[d]$ = Cummulative normal probability
- $PV(EX)$ = Ex. Price at risk-free interest rate
- S = Stock price
- t = number of periods tp exercise date
- σ = Standard Deviation
- $if d_1 is large, N(d_1) is closeto 1.0$
- $if d_1 is zero, N(d_1) is closeto 0.5$

Present Value Formlua BOND

$$PV = \sum_{t=1}^{T} \frac{cpn}{(1+r)^t} + \frac{par}{(1+r)^T}$$

where:

- cpn = Coupon rate
- r = Interest rate
- T = Number of periods
- par = Face value

Take or Die

Expansion Options: Uncertainty ↑ - Valoue of exp. option ↑ **Value of a call (takeaways)**:

- Never worth more than the stock price itself.
- When the share is worthless, the option is worthless.
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Binomial Method