

QUESTION

Suppose that the holder of the call option of question 1 exercise 6 becomes bored with waiting for it to mature. She decides to sell it after 7 months to someone else, when the asset price is \$45. Calculate a fair price for the option at that time.

ANSWER

We use data as above but now the value of the option is at  $t = \frac{7}{12} = 0.583$  with  $S = \$45$  ( $D = 0$ ).

$$\begin{aligned}C\left(45, \frac{7}{12}\right) &= 45N(d_1) - 50e^{-0.05(1-0.583)}N(d_2) \\d_1 &= \frac{\log\left(\frac{45}{50}\right) + \left(0.05 + \frac{0.03^2}{2}\right)\left(\frac{7}{12}\right)}{0.3\left(1 - \frac{7}{12}\right)^{\frac{1}{2}}} = -0.3397 \\d_2 &= \frac{\log\left(\frac{45}{50}\right) + \left(0.05 - \frac{0.3^2}{2}\right)\left(1 - \frac{7}{12}\right)}{0.3\left(1 - \frac{7}{12}\right)^{\frac{1}{2}}} = -0.5333 \\N(-0.3397) &= 0.3669 \\N(-0.5333) &= 0.2981 \\C\left(45, \frac{7}{12}\right) &= 45 \times 0.3669 - 50e^{-0.05(1-0.583)} \times 0.2981 \\&= 1.9128\end{aligned}$$

So if holder sells they make  $-2.2764 + 1.9128 = -0.3636$ .