

a) Točno kupit će unaprijedor ugovor na $F(0,7)$, pa ga prodati na $S(0)$, što je veće od $F(0,7)$

b) $F(0,T) = [S(0) - e^{-rT} D] e^{rT} \rightarrow \text{isplaću } 0 < t < T$
 $0 < r < 0.15$

$F'(0,T) = [S(0) e^{rT}]$
 P.eksp. $S(0) = 1$

$[S(0) - e^{-rt} D] e^{rt} > S(0) e^{rt}$ $t = 0.5$

$[1 - e^{-r0.5} \cdot D] e^r > 1 \cdot e^r$ $T = 1$

$e^r - e^{0.5r} > e^r$
 NE TOČNO

c) $S(0) = 85$
 $D = 5, T = 0.5$
 $r = 8\%$
 $F(0,1) = 87.0794$

a) Posudimo 85 za dionicu
 u $T=1$ ~~87.0794~~ \rightarrow vratiti
 u $t=0.5 \rightarrow$ dobijamo 5 : to oručimo $\rightarrow T=1 \rightarrow 5.2041$
 $- 82.0794 + 5.2041 + 87.0794 > 0$
 $0.2041 > 0$

Netočno, postoji mogućnost arbitraže

d)

$$S(0) = 85$$

$$r = 0.05$$

$$D = 5$$

$$T = 1$$

$$F(0,1) = 84.231$$

$$F(0,1) = [S(0) - e^{-rt} D] e^{rT}$$

$$84.231 = [85 - e^{-0.05 \cdot 1} \cdot 5] e^{0.05}$$

$$84.231 = 89.358 - 5e^{-0.05 \cdot 1}$$

$$-5.127 = -5e^{-0.05(t+0.05)}$$

$$1.0259 = e^{-0.05(t+0.05)}$$

$$0.0259 = -0.05t + 0.05$$

$$-0.0259 = -0.05t$$

$$t = 0.498$$

$$0 < t < 0.498$$

c)

$$C^E = 17.6$$

$$r = 0.1$$

$$T = 0.5$$

$$P^E > 25$$

$$x = 20$$

$$S(0) > 11.7$$

$$C^E - P^E = S(0) - x e^{-rT}$$

$$P^E = C^E - S(0) + x e^{-rT} > 25$$

$$17.6 - S(0) + 20 \cdot e^{-0.1 \cdot 0.5}$$

$$36.6246 - S(0) > 25$$

$$\therefore S(0) < 11.624$$

NETO ČNO

$$\frac{1}{2} \quad f) \quad C^E \geq S(0)$$

Točno

$$\begin{array}{c} x=10 \\ S(1)=8 \end{array}$$

U trenutku T manu na banci:

$$b(t) - x$$

$$(C^E - S(0)) e^{rT} + \min(S, x)$$

10

8

$$g) \quad S(0) + P^E \geq x \cdot e^{-rT}$$

$$C^E - P^E = S(0) - x \cdot e^{-rT}$$

Točno //

$$S(0) + P^E = \underline{\underline{C^E}} + x \cdot e^{-rT}$$

A

h) \Rightarrow počasnom d raste i $N(d)$

$$d = \frac{\ln \frac{S_0}{X} + (r + \frac{1}{2}\sigma^2)T}{\sigma\sqrt{T}}$$

budući da σ^2 brije raste od σ , vrijava i e točna //

$$\lim_{\sigma \rightarrow 0} \frac{\ln \frac{S_0}{X} + (r + \frac{1}{2}\sigma^2)T}{\sigma\sqrt{T}} = \frac{0 + 0}{1} = 0 //$$

i) $C_{op} = S(0) \cdot N(d_1) - X e^{-rT} N(d_2)$

Točno

j) $S(0) = 100$

a) $F(0,1) = 110$

$r = 0.1$

$S(0) e^{rT} = F(0,1)$

NETOČNO

b) $S(0) \cdot (1+r) = F(0,1)$

$100 \cdot 1.1 = 110$

Netočno //

c) Točno

$$F(0,1) = [S(0) - D e^{-rt}] e^{rT}$$

$$= [100 - 3 \cdot e^{-0.1 \cdot 0.5}] e^{0.5 \cdot 1}$$

$110 > 107.36$

$3 \cdot e^{0.1} = 3.31$

$110.675 > 110$

Ispлатније je

Točno //

2.

$$S(0) = 200$$

$$r = 0.04$$

$$\text{dividende } t = 0.25 \cdot k \quad k = 1, 2, 3, 4$$

$$F(0,1) = [S(0) - D_1 e^{-rt_1} - D_2 e^{-rt_2} - D_3 \cdot e^{-rt_3}] e^{rT}$$

$$= [200 - 1.5 \cdot e^{-0.04 \cdot \frac{3}{12}} - 1.515 \cdot e^{-0.04 \cdot \frac{6}{12}} - 1.5305 \cdot e^{-0.04 \cdot \frac{9}{12}}] e^{rT}$$

$$D_1 = 1.5$$

$$D_2 = 1.515$$

$$D_3 = 1.5305$$

$$D_4 = 1.545$$

$$= \underline{\underline{203.525}} \quad //$$

3.

$$S(0) = 110$$

$$T = 0.5$$

$$r = 0.05$$

$$r_D = 0.02$$

$$F(0,0.5) = 112$$

$$F'(0,0.5) = S(0) \cdot e^{(r - r_D)T}$$

$$= 110 \cdot e^{(0.03) \cdot \frac{6}{12}} =$$

$$= 111.662 \quad \rightarrow 1000 \text{ je fer cijena}$$

e) je točan

$$S(0) = 0.5$$

$$E[S(1)^\alpha] = 1.4$$

$$\frac{dS(t)}{S(t)} = 0.05 dt + 0.2 dZ(t)$$

$$T=1$$

$$r = 0.03$$

$$dW = Z \sqrt{dt}$$

$$\mu = 0.05 - \text{drift} = m$$

$$\sigma = 0.2 - \text{volatility}$$

$$E[e^{-rt} S(t)] = S_0 e^{(m-r+\frac{1}{2}\sigma^2)t}$$

$$E[S(1)^\alpha] = \frac{S(0)^\alpha \cdot e^{(m-r+\frac{1}{2}\sigma^2)t}}{e^{rt}} = 1.4$$

$$S(0)^\alpha \cdot e^{(m-r+\frac{1}{2}\sigma^2)t} = 1.4 \cdot e^{rt}$$

$$0.5^\alpha \cdot e^{(0.05 - 0.03 + \frac{1}{2} \cdot 0.04) \cdot 1} = 1.4 \cdot e^{0.03}$$

$$0.5^\alpha = \frac{1.4426}{e^{0.04}} = 1.386 \quad | \ln$$

$$\alpha \cdot \ln 0.5 = \ln(1.386)$$

$$-0.693 \alpha = 0.3264$$

$$\alpha = \underline{-0.471} \quad //$$

$$X \div 85$$

$$T = \frac{4}{12}$$

$$C^E = 8$$

$$\frac{1}{\sqrt{12}}$$

$$\sigma = 26\% = 0.26$$

$$r = 0.05$$

$$d_1 = \frac{\ln \frac{80}{85} + \left(r + \frac{1}{2}\sigma^2\right)T}{\sigma\sqrt{T}} = \frac{\ln \frac{80}{85} + (0.05 + \frac{1}{2} \cdot 0.26^2) \cdot \frac{4}{12}}{0.26\sqrt{\frac{4}{12}}}$$

$$= 1.02389$$

$$d_2 = 0.87$$

$$N(d_1) = \underline{0.8461}$$

$$N(d_2) = 0.8078$$

$$C^E = S(0) \cdot N(d_1) - X e^{-rT} N(d_2)$$
$$= 85 \cdot 0.8461 - 75 \cdot e^{-0.05 \cdot \frac{4}{12}} \cdot 0.8078$$
$$= 12.335$$

$$\frac{t = \frac{8}{12}}{8 \cdot e^{0.05 \cdot \frac{8}{12}}} = 8.271 \rightarrow \text{dugute toljko banchi, a ima}$$

$$C^E = 12.335$$