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Assignment3

HW3.

Q1:
① $\frac{0.2}{1.025} + \frac{0}{1.027^2} + \frac{3.2-100F}{(1.029)^3} = 0.$

$F = 3.4125\%$. calculated by excel.

②. calculate the value of the swap:

$100000000 \times \left(\frac{0.8\%}{1.25} + \frac{0.8\%}{1.027^2} + \frac{0.8}{(1.029)^3}\right) = 2.2732 \times 10^6$

Q2: float rate:

$3.2\% \times 0.25 \times 100 = 0.8.$

fixed rate.

$3.6\% \times 0.25 \times 100 = 0.9$

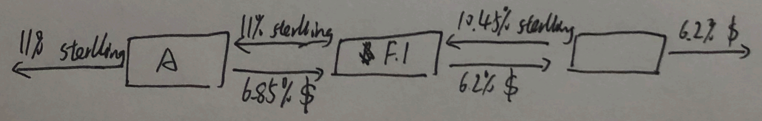
the value of the swap is V_{swap}

$$V_{swap} = V_1 - V_2 = 0.8 \cdot e^{-0.038\times\frac{1}{6}} + 1 \cdot e^{-0.038\times\frac{5}{12}} + 1 \cdot e^{-0.038\times\frac{8}{12}} + 1 \cdot e^{-0.038\times\frac{11}{12}} + 1 e^{-0.038\times\frac{14}{12}} -$$
$$\left(0.9 \cdot e^{-0.038\times\frac{1}{6}} + 0.9 \cdot e^{-0.038\times\frac{5}{12}} + 0.9 \cdot e^{-0.038\times\frac{8}{12}} + 0.9 \cdot e^{-0.038\times\frac{11}{12}} + 0.9 \cdot e^{-0.038\times\frac{14}{12}}\right)$$

$= 0.289.$ calculated by excel

$\therefore$ the value of V_{swap} is 0.289 million

Q3: We can draw the detail in the transaction.



Profit of A $7\% - 6.85\% = 0.15\%$

Profit of B $10.6\% - 10.43\% = 0.15\%$

Profit of Bank $(6.85\% - 6.2\%) + (10.43\% - 11\%) = 0.1\%$

Q4: $500 \times (10 + 0.2 \times 58) = 10800$

① $500 \times (10 + 0.1 \times 64) = 8200$

$\therefore$ margin requirement is 10800

②: $500 \times (10 + 0.15 \times 58) = 9350$

$500 \times (10 + 0.1 \times 64) = 8200$

$\therefore$ margin requirement is 9350

③: $500 \times (10 + 0.2 \times 70 - 6) = 9000$

$500 \times (10 + 0.1 \times 64) = 8200.$

$\therefore$ margin requirement is 9000

④. the trader doesn't need to pay the margin requirements

Q5: suppose. P is the profit.

①.

P_s is the profit of stock

P_p is the profit of put option

P_c ———————— call ~.

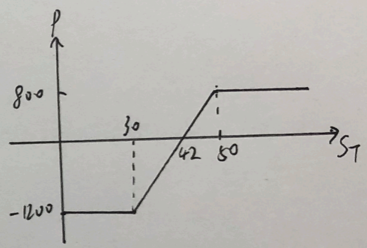
$P = P_s + P_p + P_c$. S_T is the stock price. in time T

$P_s = 100(S_T - 40)$. $P_p = -700 + (30 - S_T)^+ \cdot 100$

$P_c = 5 \times 100 - (S_T - 50)^+ \cdot 100$

$$P = P_s + P_p + P_c = -4200 + 100 S_T + [(30-S_T)^+ - (S_T-50)^+] \times 100.$$

$$= \begin{cases} 800 & S_T \in [50, 100) \\ 100S_T - 4200, & S_T \in [30, 50) \\ -1200 & S_T \in (0, 30] \end{cases}$$



②. similar to. ①.

$$P = P_s + P_p + P_c = 100(S_T - 40) + 1000 - (S_T - 50)^+ \times 200 - 1400 + (30 - S_T)^+ \cdot 200$$

$$= 100 S_T - 4400 + [(30-S_T)^+ - (S_T-50)^+] \times 200$$

$$= \begin{cases} 100(56 - S_T) & S_T \in [50, 100) \\ 100(S_T - 44), & S_T \in [30, 50) \\ 100(16 - S_T) & S_T \in (0, 30) \end{cases}$$