Department of Accounting and Finance

ONLINE EXAM SUBMISSION COVER SHEET

TO BE COMPLETED BY EACH CANDIDATE
UPLOADED TO MYPLACE ALONG WITH EXAM ANSWERS
(This can be typed or handwritten)
Complete ALL Sections

Registration Number	**201724452**

[PLEASE ENSURE THIS IS ACCURATE]

If you are unable to enter you student registration number then include your name below, but note this cancels your right to anonymous marking.

Surname	**Britton**
Forename(s)	**Lewis**
Course	**Finance & Economics**
Date	**07/05/2020**
Time Started	**09:36**
Time Completed	**12:23**
Class Code	**AG313**
Title of paper (As on examination paper)	**Treasury Management & Derivatives**

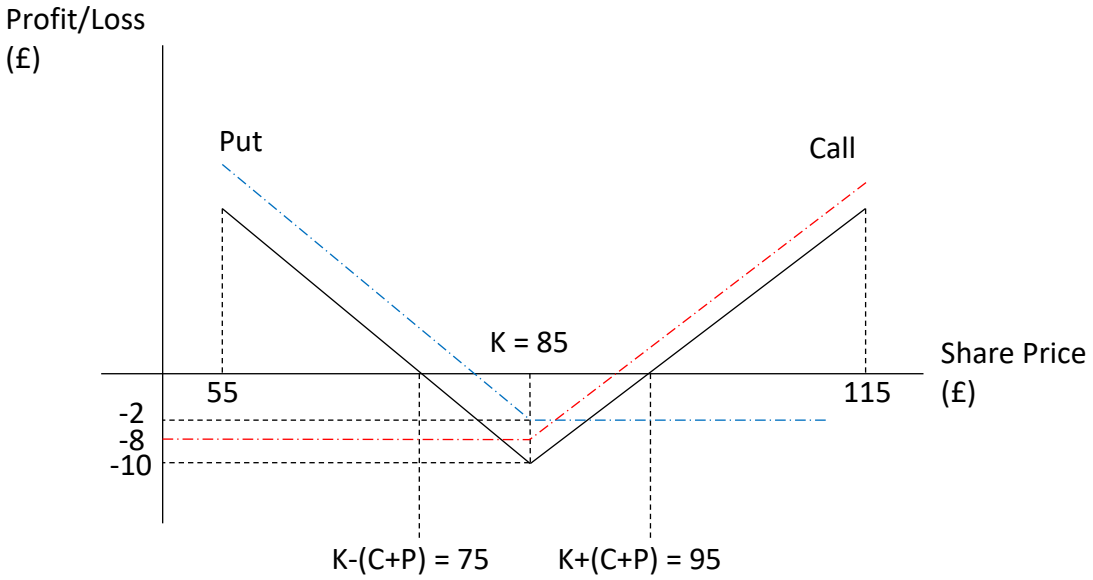
By submitting this form, I confirm that I am uploading my own work for this examination.

Students should identify the questions attempted

Question		Staff please enter marks	
1	✓		
2	✓		
3			
4	✓		
5			
6			
7			
8			
9			
10			
Total			
			%

Question 1 (a)

Share Price	Profit on Call	Profit on Put	Profit on Straddle
55	-8	28	20
65	-8	18	10
75	-8	8	0
85	-8	-2	-10
95	2	-2	0
105	12	-2	10
115	22	-2	20



Question 1 (b)

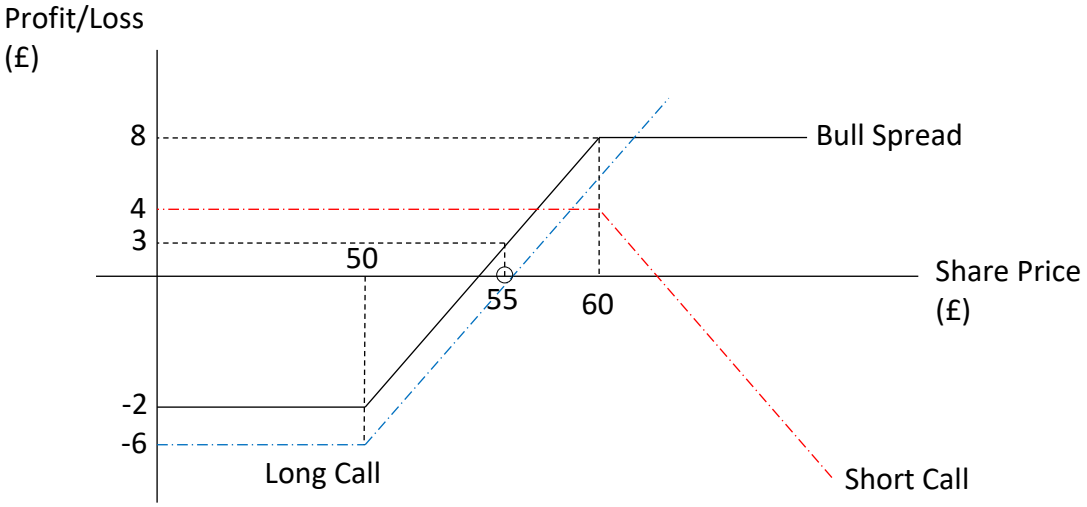
- $F = S_0 e^{rT}$
- $F = 30e^{0.08(0.5)}$
- $31.2243 \rightarrow £31.22$

- Enter a long forward to buy oil in 6 months at the £31 per barrel
- Today, short sell the oil for £30 per barrel and invest the earnings at the risk-free rate to yield the equivalent of £31.22 per barrel
- Close the short sell after the 6 month period at the selling price of £31 per barrel
- Leaves the profit of £31.22 (-) £31 = £0.22 per barrel

Question 1 (c)

Profit/Loss = Payoff from Long Call + Payoff from Short Call

- (i) S=45: (0-6)+(0+4)=-2 → (-)£2
- (ii) S=55: ((55-50)-6)+(0+4)=3 → £3
- (iii) S=65: ((65-50)-6)+((60-65)+4)=8 → £8
- (iv) *As follows:*

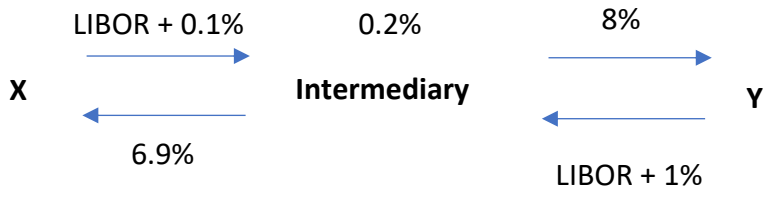


Question 1 (d)

- Total Gains from Swap = Difference in Fixed (-) Difference in Floating
- = 0.015-((LIBOR+0.006)-(LIBOR+0.001))
- = 0.010 → 1.00%

- Therefore 100 basis pts.
- Bank receive 0.2% → 20 basis pts.
- X & Y split 0.8% → 80 basis pts. → 40 basis pts. ea.

- X's Payoff = 0.065+0.004 = 0.069 → 6.9%
- Y's Payoff = LIBOR+0.006+0.004 = LIBOR+0.01 → LIBOR + 1%
- Bank's (Intermediary's) Payoff = 0.2%



Question 2 (a)

STEP 1

- $u = e^{\sigma\sqrt{\Delta t}} = e^{0.30\sqrt{0.5}} = 1.2363$
- $d = \frac{1}{u} = \frac{1}{1.2363} = 0.8088$
- $p = \frac{e^{\sigma\sqrt{\Delta t}} - d}{u - d} = \frac{e^{0.30\sqrt{0.5}} - 0.8088}{1.2363 - 0.8088} = 0.5672$

STEP 2

- $S_u = Pu = 10(1.2363) = 12.363$
- $S_d = Pd = 10(0.8088) = 8.088$
- $S_{uu} = Pu^2 = 10(1.2363)^2 = 15.284$
- $S_{ud} = Pud = 10\big((1.2363)(0.8088)\big) = 9.999 \approx 10$
- $S_{dd} = Pd^2 = 10(0.8088)^2 = 6.542$

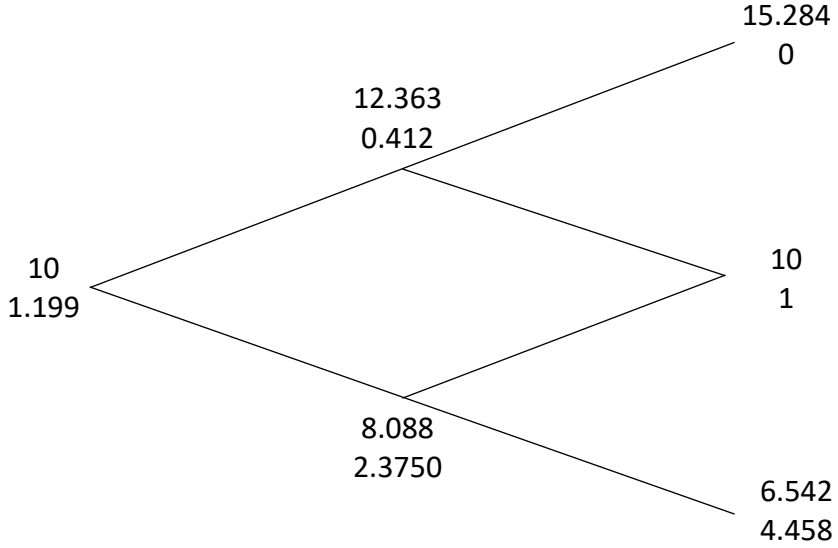
STEP 3

- $P_{uu} = 0$
- $P_{ud} = K - S_{ud} = 11 - 10 = 1$
- $P_{dd} = K - S_{dd} = 11 - 6.542 = 4.458$

- $P_u = \Big((pP_{uu}) + \big((1-p)P_{ud}\big)\Big)e^{-r\Delta t} = \Big((0.5672 * 0) + \big((1 - 0.5672) * 1\big)\Big)e^{-0.1(0.5)} = 0.412$
- $P_d = \Big((pP_{ud}) + \big((1-p)P_{dd}\big)\Big)e^{-r\Delta t} = \Big((0.5672 * 1) + \big((1 - 0.5672) * 4.458\big)\Big)e^{-0.1(0.5)} = 2.375$

- $P_0 = \Big((pP_u) + \big((1-p)P_d\big)\Big)e^{-r\Delta t} = \Big((0.5672 * 0.4117) + \big((1 - 0.5672) * 2.3750\big)\Big)e^{-0.1(0.5)} = 1.199$

STEP 4



Question 2 (b)

American Put:

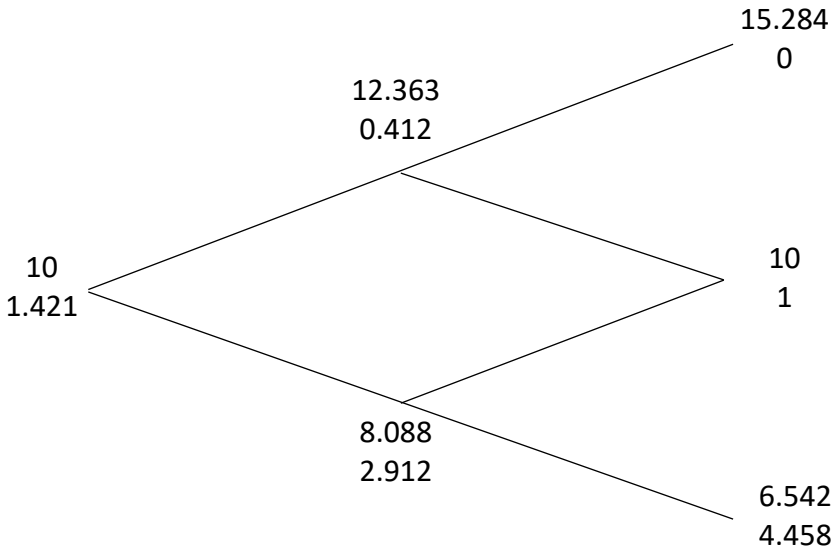
STEP 1

- $P_d = \max\{K - S_d, P_d\}$
- $P_d = \max\{11 - 8.088, 2.375\}$
- $P_d = \max\{2.912, 2.375\}$
- $2.912 > 2.375$
- $\therefore P_{d_A} = 2.912$

STEP 2

- $P_{0_A} = \left(\left(pP_{u_A}\right) + \left((1-p)P_{d_A}\right)\right)e^{-r\Delta t} = \left((0.5672 * 0.4117) + \left((1 - 0.5672) * 2.912\right)\right)e^{-0.1(0.5)} = 1.421$

STEP 3



Question 2 (c)

1: European Call

- $d_1 = \frac{\ln\left(\frac{S}{K}\right)+T\left(r+\frac{\sigma^2}{2}\right)}{\sigma\sqrt{T}} = \frac{\ln\left(\frac{100}{110}\right)+\left(\frac{6}{12}\right)\left(0.06+\frac{0.30^2}{2}\right)}{0.30\sqrt{\frac{6}{12}}} = -0.202$

- $d_2 = d_1 - \sigma\sqrt{T} = -0.202 - 0.30\left(\sqrt{\frac{6}{12}}\right) = 0.414$
- $N(d_1) = 0.42074;\ N(d_2) = 0.34090$
- $C_0 = SN(d_1) - Ke^{-rT}N(d_2) = 5.6833 \rightarrow £5.68$

2: American Call

- $C_{0_A} = C_{0_E} = 5.6833 \rightarrow £5.68$

3: European Put

- $P_0 = (C_0 + Ke^{-rT}) - S = \left(5.6833 + 110e^{-0.06\left(\frac{6}{12}\right)}\right) - 100 = 12.43 \rightarrow £12.43$

4: Put-Call Parity Hold

- $[C_0 + Ke^{-rT} = P_0 + S]$
- $C_0 + Ke^{-rT} = 5.68 + 106.75 = 112.43$
- $P_0 + S = 12.43 + 100 = 112.43$
- ∴ Put-Call Parity Holds

Question 2 (d)

STEP 1

- N short contracts to reduce risk by 0.25:
- $N = \Delta\sigma\beta_p \left(\frac{V_P}{V_F}\right) = (0.25)(1.1)\left(\frac{720\text{x}10^6}{6110.8*10}\right) = 3240.165 \rightarrow 3240$

STEP 2

- Profit/Loss of F position @ expiration
- $(F_0 - F_T)\,(10)(N) = (6110.8 - 6353.8)(10)(3240) = -7873200 \rightarrow$ Loss £7,873,200

STEP 3

- In t=3 index Δ'd by:
- $\frac{F_T - S}{S} = \frac{6353.8 - 6051.2}{6051.2} = 0.050 \rightarrow 5.00\%$

STEP 4

- Folio value $E(\Delta)$ by:
- $\Delta Index\beta = 0.05(1.1) = 0.055 \rightarrow 5.5\%$

STEP 5

- Value of folio @ expiration
- $V_P\big(1 + E(\Delta V_P)\big) = 720\text{x}10^6(1 + 0.055) = 759605235.3 \rightarrow$ £759,605,235.30

STEP 6

- Folio: (+) 759605235.3
- Dividends: (+) 450000
- Futures: (-) 7873200
- ∴ Total = 7531820353 → £753,182,035.30

STEP 7

- 3-month return:
- $\frac{Total - V_P}{V_P} = \frac{759605235.3 - 720\text{x}10^6}{720\text{x}10^6} = 0.0461 \rightarrow 4.61\%$

STEP 8

- Annualised return:
- $(1 + 3MonthReturn)^T - 1 = (1 + 0.0461)^{\frac{12}{3}} - 1 = 0.1975 \rightarrow 19.75\%$

Question 4 (a)

- $1000000(0.5116^{-1}) = 1954652.072 \rightarrow £1{,}954{,}652.07$

Question 4 (b)

- $2000(0.6667^{-1}) = 2999.8500 \rightarrow \$2999.85$

Question 4 (c)

- $F_{180} = S_0 e^{rT} = 0.008058e^{0.0191\left(\frac{1}{2}\right)} = 0.008135 \rightarrow 0.008135\$/¥$

Question 4 (d)

- Buy $10,000 @ ask rate
- $10000(1.631^{-1}) = 6131.2078 \rightarrow \$6131.21$
- Resell @ bid rate
- $6131.2078(1.624) = 9957.0815 \rightarrow \$9957.08$
- ∴ Cost of Transactions = $42.92

Question 4 (e)

- $\$/€ = \frac{1}{€/\$} = €/\$^{-1} = 0.8^{-1} = 1.25 \rightarrow 1.25\$/€$

Question 4 (f)

- $p = \frac{(1+0.05)}{(1+0.03)} = 1.0194$
- $F = 1.5(1.0194) = 1.5291 \rightarrow 1.5291\$/€$

Question 4 (g)

- Margin Call when 1000-500=1000 is lost
- $62500€(1.5\$) = \$93{,}750$
- $93750 - 1000 = 92750 \rightarrow \$92{,}750$
- $Settlement\ Price \rightarrow \frac{92750}{62500} = 1.484\$/€\ Req.$