QN1: Basic Data

(a) Current date = 1/1/2019

(b) Face value = 1000

(c) Issue date = 1/1/2017

(d) Coupon Rate = 9.5%

(e) Overall life = ~~10 years~~ 11 years

(f) Maturity date = 31/12/2027 to 31/12/27

(g) Premium = 125.75

(h) Issued Price = 1125.75 on 1/1/2019 [1000 + 125.75]

(i) Remaining life → 9 years

value of a Bond is PV of Future CF which the Bond can generate.

1125.75 is the PV of Future CF which the Bond can generate.

Coupon RV

PV

Ideally NPV of Bond → 0

1125 = PV of Coupon + RV  1125 − Coupon − RV = 0

| YR | CF | DF 7.62% | DCF | DF 6.62% | DCF |
|---|---|---|---|---|---|
| 0 | (1125.75) | 1.000 | (1125.75) | 1.00 | (1125.75) |
| 1-9 | 95 | 6.34 | 602.30 | 6.74 | 640.30 |
| 9 | 1000 | 0.516 | 516 | 0.581 | 581 |
| | | | −7.45 | | +95.55 |

WN: Yield to Maturity } IRR

$$\frac{\text{Coupon} + \frac{(RV - IP)}{\text{Life}}}{\left[\frac{RV + IP}{2}\right]} = \frac{95 + \left(\frac{1000 - 1125.75}{9}\right)}{\left[\frac{1000 + 1125.75}{2}\right]}$$

$$\text{Approximate IRR} = \frac{95 - 13.97}{1062.875} = 7.62\%$$

$$7.62 - \left(\frac{7.45}{103}\right) = \underline{\underline{7.54.1.}}$$

W.N: volatility

$$\frac{\text{Duration}}{(1+\text{yield})} = \frac{6.27}{1.08} = 5.80\%$$

For every 1% change in yield, Price will change by 5.80%.

WN: Revised Price

(a) Decrease in yield = 50 basis points

(b) Price will increase by $5.80 \times 0.5 = 2.901$

(c) Revised Price $= 971.2 + 2.901 = 999.36$ ₹

WN: Beta

| Particulars | Formulae | Comp | Result |
|---|---|---|---|
| $\beta_A$ | $\frac{\sigma_A}{\sigma_M} \times Corr_{AM}$ | $20/15 \times 0.6$ | 0.80 |
| $\beta_B$ | $\frac{\sigma_B}{\sigma_M} \times Corr_{BM}$ | $18/15 \times 0.95$ | 1.14 |
| $\beta_C$ | $\frac{\sigma_C}{\sigma_M} \times Corr_{CM}$ | $12/15 \times 0.75$ | 0.60 |

WN2: Covariance

| Particulars | Formulae | Comp | Result |
|---|---|---|---|
| $Cov_{AB}$ | $\beta_A \times \beta_B \times \sigma_m^2$ | $0.8 \times 1.14 \times 225$ | 205.20 |
| $Cov_{BC}$ | $\beta_B \times \beta_C \times \sigma_m^2$ | $1.14 \times 0.6 \times 225$ | 153.90 |
| $Cov_{AC}$ | $\beta_A \times \beta_C \times \sigma_m^2$ | $0.8 \times 0.6 \times 225$ | 108 |

WN 3: Combined Risk of 3 Securities < Markowitz Matrix method

| | | A | B | C |
|---|---|---|---|---|
| | | 1/3 | 1/3 | 1/3 |
| A | 1/3 | 400 | 20520 | 108 |
| B | 1/3 | 20520 | 324 | 153.90 |
| C | 1/3 | 108 | 153.90 | 144 |

AA → $\sigma_A^2$

AB – $Cov_{AB}$

AC – $Cov_{AC}$

BA – $Cov_{BA}$

BB – $\sigma_B^2$

CC – $\sigma_C^2$

| Combination | Computation | Result |
|---|---|---|
| AA → | $1/3 \times 1/3 \times 400$ | |
| AB — | $1/3 \times 1/3 \times 205.20$ | |
| AC | $1/3 \times 1/3 \times 108$ | |
| BA | | |
| BB | | |
| BC | | |
| CA | | $\sqrt{200.24} = 14.15$ |
| CB | | |
| CC | | |

WN: Overall $\beta$

$$= \left(0.8 \times 1/3\right) + \left(1.14 \times 1/3\right) + \left(0.60 \times 1/3\right)$$

$$\beta_0 = \underline{\underline{0.846}}$$

Total Risk = 14.15

DR → Unsystematic → Bar 219

$\sqrt{14.15^2 - 12.69^2}$

6.26

NDR → Systematic → $\beta_0 \times \sigma_m$

$0.846 \times 15$

12.69

200,000
I
II
III
x
y
x and y
200,000
200,000
60%
40%
120,000
80,000

WN: variance

(a) $\sigma_x^2 = 4.80$

(b) $\sigma_y^2 = 4.25$

(c) $\sigma_m^2 = 3.10$

Q.N 2: Portfolio Return

Option 1 → X → 15.1.

y → 14.1.

x and y → 14.6.1.

WN: Beta

$$\beta_x = \frac{Cov\,xm}{\sigma^2_m} = \frac{3.37}{3.10} = \underline{\underline{1.08}}$$

$$\beta_y = \frac{Cov\,ym}{\sigma^2_m} = \frac{2.80}{3.10} = \underline{\underline{0.90}}$$

$$\beta_{x\,and\,y} = (1.08 \times 0.6) + (0.90 \times 0.4) = \underline{\underline{1.008}}$$

$\hookrightarrow \beta_0$

wn. Portfolio variance

| | x (0.6) | y (0.4) |
|---|---|---|
| x (0.60) | 4.80 | 4.30 |
| y (0.4) | 4.30 | 4.25 |

| Partial products | Comp | Result |
|---|---|---|
| $xx$ | $0.6 \times 0.6 \times 4.80$ | $1.728$ |
| $xy$ | $0.6 \times 0.40 \times 4.30$ | $1.032$ |
| $yx$ | $0.4 \times 0.6 \times 4.30$ | $1.032$ |
| $yy$ | $0.4 \times 0.4 \times 4.25$ | $0.68$ |

$$\sqrt{4.472} = 2.11$$

WN: Expected Return → CAPM

In the absence of info

Expected Return → $\sum$ outcome × P

Required Return → CAPM → $R_f + \beta[R_m - R_f]$

option 1 $\rightarrow 10 + 1.08[12 - 10] = \underline{\underline{12.16}}$

option 2 $\rightarrow 10 + 0.9(12 - 10) = \underline{\underline{11.80}}$

option 3 $\rightarrow 10 + 1.008(12 - 10) = \underline{\underline{12.016}}$

Total Risk = 2.11 [60.1 % × 40.1 %]

DR

$\sqrt{2.11^2 - 1.774^2}$

1.14

NDR

$\beta_0 \times \sigma_m$

= 1.008 × 1.76

= 1.774

WN: Sharpe Ratio $= \dfrac{R_p - R_f}{\sigma_p}$

option 1 $\rightarrow \dfrac{15\% - 10\%}{2.19} = \underline{\underline{2.28}}$

option 2 $\rightarrow \dfrac{14\% - 10\%}{2.06} = \underline{\underline{1.94}}$

option 3 $\rightarrow \dfrac{14.60 - 10}{2.11} = \underline{\underline{2.18}}$

For every 1% Risk → How much is the Return Premium

W.N.: Treynors Ratio

Option I → $\frac{15-10}{1.08} = 4.62$

II $\frac{14-10}{0.90} = 4.44$

III $\frac{14.6-10}{1.008} = 4.56$

WN: Alpha = Expected Return − CAPM

Option I → 15% − 12.16 = 2.84 +ve

II 14% − 11.80 = 2.20 +ve

III 14.60% − 12.016 = 2.584 +ve

BUY

WN1: Basic Data

| Particulars | D | K |
|---|---|---|
| (a) NAV | 70.71 | 62.50 |
| (b) Equity | 70.00 (99%) | 60 (96%) |
| (c) Cash | 0.71 | 2.50 |

WN2: Beta

| Particulars | D | K |
|---|---|---|
| (a) Sharpe | 2 | 3.30 |
| (b) Treynors | 15 | 15 |
| (c) Std deviation | 11.25 | 5 |
| (d) $R_p - R_f$ [a × c] | 22.50 | 16.50 |
| (e) β [d / b] | 1.50 | 1.10 |

WN 3: Revised ~~Equity~~ Cash

| | Particulars | D | K |
|---|---|---|---|
| (a) | Opening Bal | 0.71 | 2.50 |
| (b) | Monthly Exp (3/12) | 0.25 | 0.25 |
| | | 0.46 | 2.25 |
| (c) | C/B | | |

WN 4: Revised Equity

| Particulars | D | K |
|---|---|---|
| (a) Opening Equity | 70 | 60 |
| (b) ½ Gall | 7.5 L. [5 x 1.5] | 5.5 L. [5 x 1.1] |
| (c) Revised Equity | 64.75 | 56.70 |

WNS: Revised NAV

| Particulars | D | K |
|---|---|---|
| (a) Revised Eq | 64.75 | 56.70 |
| (b) Revised Cash | 0.46 | 2.25 |
| (c) C/B | 65.21 | 58.95 |

WN1: Basic Data

(a) No of Contract sold = 5

(b) Duration of Future : 4 months

(c) Value sold = 900,000

(d) Index value in Spot on Expiry = 2100

(e) Multiplier = 75

(f) value of Nifty future today = ?

WN2: Value of One Nifty future

(a) value of one contract $= \frac{900,000}{5} = 180,000$

(b) value of one Nifty future $= \frac{180,000}{75} = 2400$

Today — Expiry

$S_0 = ? < F_0$

$F_0 = \boxed{2400}$ contract today future date

$S_1 = 2100 \rightarrow$ Index

$F_1 = 2100 \rightarrow$ Futures

↳ Cancellation Rate

WN: Theoretical Spot Price today

$$S_0 \times e^{(r-y)t} = F_0 \qquad e^{0.01} = 1.01 + \frac{0.01^2}{2}$$

$$S_0 \times e^{(0.09-0.06)\,4/12} = 2400 \qquad e^{0.01} = 1.01005$$

$$S_0 \times e^{0.01} = 2400 \qquad S_0 = \frac{2400}{1.01005} = 2376.11$$

WN: Contango | Backwardation

$S_0 = 2376$

$F_0 = 2400$

$S_0 - F_0 \quad -24$

Maximum Contango

<u>Gn</u>: <u>Payoff</u>

(a) Sell Nifty futures = 900,000

(b) Buy Nifty future on Expiry = 787500

[2100 × 75 × 5]

(c) Gain = 112500

UNI: Basic Data

(a) Trader planned to sell 22000 Kg after 3m

(b) Current position → Buy 22000 Kg @ 60 ₹ → Position in Cash market

(c) Future Price ($F_0$) = 59

(d) Contract Size = 1000 Kg

(e) Expected $S_1$ = 56

WN: Action to be taken

Short

In order to hedge, the trade should $\boxed{\text{Sell}}$ futures at 59₹. This way loss can be minimized.

WN: PROOF

| SPOT MARKET | | FUTURES MARKET | |
|---|---|---|---|
| (a) Buy 22000kg @ 60₹ | 1320000 | (a) Sell 22000 @ 59 | 1298000 |
| (b) Sell 22000kg @ 57 | 1254000 | (b) Buy 22000 @ 58 | 1276000 |
| (c) loss | 66000 | (c) Gain | 22000 |
| | | Net loss | 44000 |

UNIT: Basic Data

| Particulars | BID | ASK | |
|---|---|---|---|
| (a) Spot Rate | 105.00 | 106.50 | – Citi bank [yen/$] |
| (b) Spot Rate [Hongkong] | 0.0090 | 0.0093 | – $/yen |
| | 111.11 | 107.52 | |

107.52 – 111.11

Both are not the same. Citi bank is cheaper than Hong Kong

WN2: Arbitrage Action [we should go to the cheaper Bank and then Expensive bank]

WN1: Basic Data

(a) 107.31 yen/$

(b) 1.26 $/£

(c) 0.70 $/AUD

WN2: yen/£

$$\frac{\text{yen}}{£} = \frac{\text{yen}}{\$} \times \frac{\$}{£}$$

$$135.21 = 107.31 \times 1.26$$

WN4: AUD/£

$$\frac{\text{AUD}}{£} = \frac{\text{AUD}}{\$} \times \frac{\$}{£}$$

$$1.80 = \frac{1}{0.70} \times 1.26$$

WN3: yen/AUD

$$\frac{\text{yen}}{\text{AUD}} = \frac{\text{yen}}{\$} \times \frac{\$}{\text{AUD}} = 107.31 \times 0.70 = 75.11 \text{ yen/AUD}$$

WN1: Basic Data

(a) Spot = 1.35 \$/£

(b) 3m F = 1.30 \$/£ → Buy

(c) So after 3m will be 1.32

(d) Forward cancellation rate after 3m will be 1.32 → Sell

In order to Speculate, I should buy forward @ 1.30 today and cancel @ 1.32 which will result in Profit of 0.02 \$/£

Q N 2. Actual Profit

(a) Buy @ 1.30 \$/£

(b) Sell @ 1.26 \$/£

(c) Loss 0.04 \$/£

(d) Total loss = 0.04 × 10,00,000 £ = 40,000 \$

Q.N 1: Forward Rate £ / €

| Particulars | Bid | Ask |
|---|---|---|
| (a) Spot | 0.6858 | 0.6869 |
| (b) 91 day | 0.0037 | 0.0040 |
| (c) Forward | 0.6895 | – 0.6909 |

WN2: Forward Rate for CHF/£

| Particulars | Bid | Ask |
|---|---|---|
| (a) Spot | 2.3295 | 2.3326 |
| (b) 91 day | 0.0242 - | 0.0228 |
| (c) Forward | 2.3053 - | 2.3098 |

WN3: C/B under current scenario (20, 20, 511)

| Particulars | Holding | Swiss | Dutch |
|---|---|---|---|
| (a) O/B | 150,000 £ | 1996,154 CHF | 1450,000 € |
| (b) Int | 1% | 0 50% | 2% |
| (c) Int for 91 days | 379.16 | 2523 | 7330 |
| (d) C/B | 150,379 £ | 19.9677 CHF | 14,57,330 € |
| (e) Exchange Rate | – | 2.3098 CHF/£ | 0.6895 £/€ |
| (f) C/B in £ | 150379 | 865303 | 1004829 |

WN4: Revised Scenario

| Particulars | Holding | Swiss | Dutch |
|---|---|---|---|
| (a) O/B | 150,000 £ | 1996154 CHF | 1450,000 € |
| (b) Spot Rate | – | 2.3326 | 0.6858 |
| (c) O/B in £ | 150,000 £ | 855763 £ | 994,410 |

O/B in £ 20,00,173

C/B in £ desired 20,20,511

Int amt 20,338

$$20,00,173 \times \frac{x}{100} \times \frac{91}{360} = 20,338$$

4.02 %

$$(1+4.48\%)^3 = (1+4.20\%)^2 \times (1+FRA)$$

$$1.1405 = 1.0857 \times 1+FRA$$

should be FRA

$$5.04\%$$

WN: Int Rate Guarantee [Int Rate Option] Right to Borrow

| Particulars | I | II |
|---|---|---|
| (a) Exercise Rate | 5.04% | 5.04% |
| (b) Actual Rate | 5.5% | 4.5% |
| (c) Action | Exercise | Lapse |
| (d) Outflow | 5.04% | 4.5% |
| (e) Premium | 0.10% | 0.10% |
| (f) CIB | 5.14% | 4.60% |
| In ₹ (100 cr) | 5.14 cr | 4.60 cr |

value of firm
PV
DF
WACC
Future CF
PAT + Dep -
Capex - ΔWC

0
1
2
3
4
1342.50
1619.62
1953
2680
Perpetuity
Normal CF
Table
Perpetual CF
CF
WACC - g

Stage 1 : PV of High growth CF

| YR | CF | DF 15% | DCF |
|---|---|---|---|
| 1 | 1342 | | |
| 2 | 1619 | | |
| 3 | 1453 | | |
| | | | 3676 |

Stage 2: PV of Perpetual CF

$$P_0 = \frac{D_1}{K_e - g}$$

$$\text{Value}_0 = \frac{CF_1}{WACC - g}$$

$$38285 = \frac{2680}{15\% - 8\%} \leftarrow \text{Value}_3 = \frac{CF_4}{WACC - g}$$

$$38285 \times 0.657 = 25173 + 3676 = 28849$$