CLASS 9

• Beta Management

Active Management
↓
You will forecast the market ↑ ↓
↓
MKT ↑ . . . . . β_p ↑
MKT ↓ . . . . β_p ↓

How to ↑↓ β_p <
- Using Rf investment or Borrowing
- Using Stock Index Futures (to be done in Derivatives)

Q No. 1

i)

Security	Market Value (No. of sh × sh Price)	weights	β	W × β
VSL	500,000	5/12	0.9	0.375
CSL	100,000	1/12	1.	0.083
SML	200,000	2/12	1.5	0.250
APL	400,000	4/12	1.2	0.400
	1200,000			1.108

$\therefore \beta_p = 1.108$

ii) Target Beta = 0.8

$\therefore$ Weight of existing Portfolio $= \frac{0.8}{1.108} = 72.20\%$

This is 12,00,000

So Total Portfolio $= \frac{1200,000}{.722} = 16,62,050$

$\therefore$ Amount to be invested at Rf = 462,050

iii) Target $\beta_p = 1.2$

$\therefore$ weight of existing Portfolio $= \frac{1.2}{1.108} = 108.30\%$ approx

This represents 12,00,000

$\therefore$ Total Portfolio $= \frac{1200,000}{1.083} = 11,08,033$

$\therefore$ Investment in R_f $= 1108,033 - 12,00000$
$= -91967$

This means that we should borrow ₹91967 at R_f

- Total Risk (TR), Systematic Risk (SR) & Unsystematic Risk (UR) of a stock

variance & not sd.

$TR = SR + UR$ (in variance terms not sd)

This equation is in terms of variance (not sd)

Warm up:

Suppose sd of Reliance Industries = 30%

$\therefore$ Total Risk $= 30^2 = 900$

Suppose Beta of Reliance $= 1.2$

What does it mean?

It means if market changes by 1%, Reliance is expected to change by 1.2%.

suppose sd of market = 20%

∴ Sd of Reliance due to market volatility = 20×1.2
$= 24\%$

∴ Systematic Risk (SR) of Reliance = 24^2
$= 576$

∴ Unsystematic Risk (UR) of Reliance = TR − SR
$= 900 - 576$
$= 324$

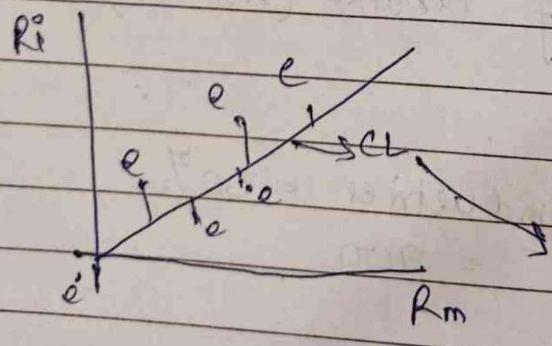
Sir what are the formulas?

x = Mkt
y = stock

$TR = \sigma y^2 = (30)^2 = 900$

$SR = \beta^2 \sigma m^2 = (1.2)^2 \times (20)^2 = 576$

$UR = \sigma e^2 = TR - SR = 900 - 576 = 324$



$R_i = \alpha + \beta R_m$

$R_i = \alpha + \beta R_m + e$

$\sigma R_i^2 = 0 + \beta^2 \sigma m^2 + \sigma e^2$

v. imp v. much frequent in Exam

Q2. Pls remember x = return on mkt

y = return on stock

Yrs	X	Y	$X-\bar{X}$	$Y-\bar{Y}$	$(X-\bar{X})^2$	$(Y-\bar{Y})^2$	$(X-\bar{X})(Y-\bar{Y})$
1							
2							
3							
4							
	ΣX	ΣY			$\Sigma(x-\bar{x})^2$	$\Sigma(y-\bar{y})^2$	Σ
	$\div n$	$\div n$			$\div n$	$\div n$	
	$= \bar{X}$	$= \bar{Y}$			$= \sigma x^2$	$= \sigma y^2$	$\mathrm{cov}(x,y)$

(CA) dont do this way

$$\sigma x^2 = \frac{\Sigma (x-\bar{x})^2}{n}$$

or

$$\frac{\Sigma x^2 - n\bar{x}^2}{n}$$

$$\sigma y^2 = \frac{\Sigma (y-\bar{y})^2}{n}$$

or

$$\frac{\Sigma y^2 - n\bar{y}^2}{n}$$

$$\mathrm{cov}(x,y) = \frac{\Sigma (x-\bar{x})(y-\bar{y})}{n}$$

or

$$\frac{\Sigma xy - n\bar{x}\bar{y}}{n}$$

Note : α wala sum exam me nikalne aya to ye wale with formula se nikalna safe rahega

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Date

$$\beta = \frac{cov(x,y)}{\sigma x^2}$$

ICAI

$$= \frac{\Sigma xy - n\bar{x}\bar{y}}{\Sigma x^2 - n\bar{x}^2}$$

α = eg $\bar{y} = a + b\bar{x}$

$\downarrow$

α

Good news

$\downarrow$

Q.

Yrs	X	Y	X^2	Y^2	XY
1	8	10	64	100	80
2	10	12	100	144	120
3	9	9	81	81	81
4	-1	3	1	9	-3
	26	34	246	334	278

$\bar{x} = \frac{26}{4} = 6.5$ $\quad \Sigma x^2 = 246$

$\Sigma y^2 = 334$

$\bar{y} = \frac{34}{4} = 8.5$

$\Sigma xy = 278$

$$\beta = \frac{\Sigma xy - n\bar{x}\bar{y}}{\Sigma x^2 - n\bar{x}^2}$$

$$= \frac{278 - 4 \times 6.5 \times 8.5}{246 - 4 \times (6.5)^2} = \frac{57}{77} = 0.74$$

$\bar{y} = a + b\bar{x}$

$8.5 = a + 0.74 \times 6.5$

$8.5 - 4.81 = a$

$\therefore a = 3.69 = \alpha$

$\therefore$ U R —

$\hat{R_i} = \alpha + \beta R_m$

$\hat{R_i} = 3.69 + 0.74 R_m$ (Ans)

ii

$TR = \sigma_y^2 = \dfrac{\Sigma y^2 - n\bar{y}^2}{n}$

$= \dfrac{334 - 4 \times (8.5)^2}{4} = \dfrac{45}{4} = 11.25$

$SR = \beta^2 \sigma_m^2$

$\sigma_m^2 = \sigma_x^2 = \dfrac{\Sigma x^2 - n\bar{x}^2}{n} = \dfrac{246 - 4 \times (6.5)^2}{4}$

$= \dfrac{77}{4} = 19.25$

$\therefore SR = \beta^2 \sigma_m^2$
$= (0.74)^2 \times 19.25$
$= 10.54$ (Ans)

$\therefore UR = TR - SR = 11.25 - 10.54 = 0.71$ (Ans)

kabhi nai aya hai
aane ka chance bahut kam hai

Note: There is a term called "coefficient of determination" $= r^2 = \frac{SR}{TR}$

Let us check:

$$r = \frac{cov(x,y)}{\sigma_x \sigma_y}$$

(OR) $$= \frac{\Sigma xy - n\bar{x}\bar{y}}{\sqrt{(\Sigma x^2 - n\bar{x}^2)(\Sigma y^2 - n\bar{y}^2)}}$$

$$= \frac{278 - 4 \times 6.5 \times 8.5}{\sqrt{77 \times 45}} = \frac{57}{58.86}$$

$$= 0.9684$$

$$\therefore r^2 = (0.9684)^2$$
$$= 0.9378 \cong 94\%$$
$$\cong \frac{SR}{TR}$$

$$= \frac{10.54}{11.25}$$

$$\cong 94\%$$