Unit 3: Porfolio Analysis & Management

① Correlation (ρ) $= \dfrac{cov_{1,2}}{\sigma_1, \sigma_2}$, σ = Standard deviation

→ Correlation coefficient is a statistical concept which helps in establishing a relation between predicted and actual values obtained.
→ The correlation coefficient value always lies between -1 and +1

② Covariance = Correlation $\times \sigma_1 \times \sigma_2$

Population Covariance Formula

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

Sample covariance

$$cov(x,y) = \frac{\Sigma(x-\bar{x})(y-\bar{y})}{N-1}$$

→ Covariance is a measure to show the extent to which given two random variables change with respect to each other.
→ The value of covariance lies between $-\infty$ and $+\infty$.

③ Weighted Average ($\bar{r}$) = $w_1 r_1 + w_2 r_2$

r = return

w = weight

_/_/_

④ Standard deviation :

→ Portfolio Standard Deviation refers to the volatility of the portfolio.
→ A high standard deviation highlights that the portfolio risk is high, and the return is more volatile and unstable.
→ A low Standard Deviation implies less volatility and more stability in the returns of a porfolio.

$$\sigma = \sqrt{w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2 COV_{1,2}}$$

$$\sigma = \sqrt{w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + w_3^2\sigma_3^2 + 2w_1w_2 COV_{1,2} + 2w_2w_3 COV_{2,3} + 2w_3w_1 COV_{3,1}}$$

⑤ Beta
→ Beta measure of the volatility of a Security compared to the market as a whole

→ Beta of the Market = 1

$$\beta = \frac{cov(i,m)}{variance(m)(\sigma_m^2)} \quad , \quad \beta = \frac{\rho\sigma_i}{\sigma_m}$$

variance measures the degree of disperison of data around the sample's mean.
→ used to see how much risk an investment carries.

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⑥ Systematic risk

→ Systematic risk is also known as market risk or undiversifiable risk and can rise from the factors such as inflation, recessions, war, change in interest rates. It affects not just a particular stock or industry, but the overall market.

$$\text{Systematic risk} = \beta^2 \sigma_m^2$$

$$\text{Total risk} = \sigma_i^2$$

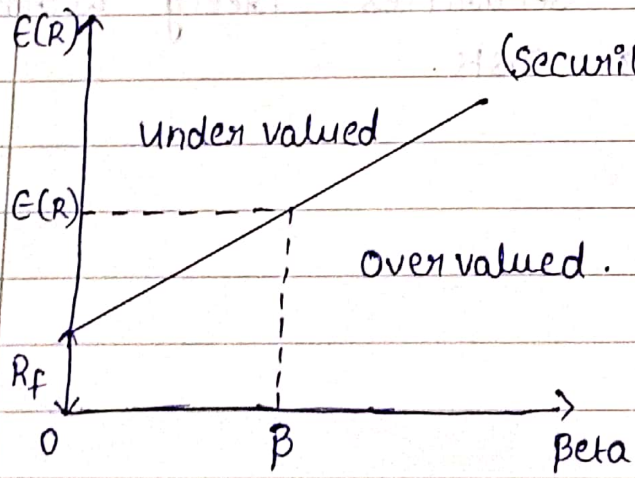
$$\text{unsystematic risk} = \text{Total risk} - \text{Systematic risk.}$$

unsystematic risk or company specific risk, is a risk associated with a particular investment. It can be mitigated through diversification.

⑦ Coefficient of variance $= \frac{\sigma_x}{x}$

⑧ Capital Asset pricing Model (CAPM)

(Security Market line)



$$E(R) = R_f + \beta\overbrace{(R_M - R_f)}^{\text{Market risk premium}}$$

R_m = Return of Market

R_f = Risk free

$E(R)$ = Expected return.

Applications:

- Cost of equity for stock valuation.
- Inclusion of stock in a Diversified portfolio or not.

Assumptions:

→ Homogenuous expectations:

All investors have same expectations regarding asset returns, risks, and correlations.

→ Investors are rational & risk awarse:

Investors are risk averse, preferring lower risk for a given level of return, and are only willing to take on more risk if they expect higher returns.

→ Infinite diversity:

Investors hold well-diversified portfolios that eliminate unsystematic risks and correlations.

→ No transaction cost:

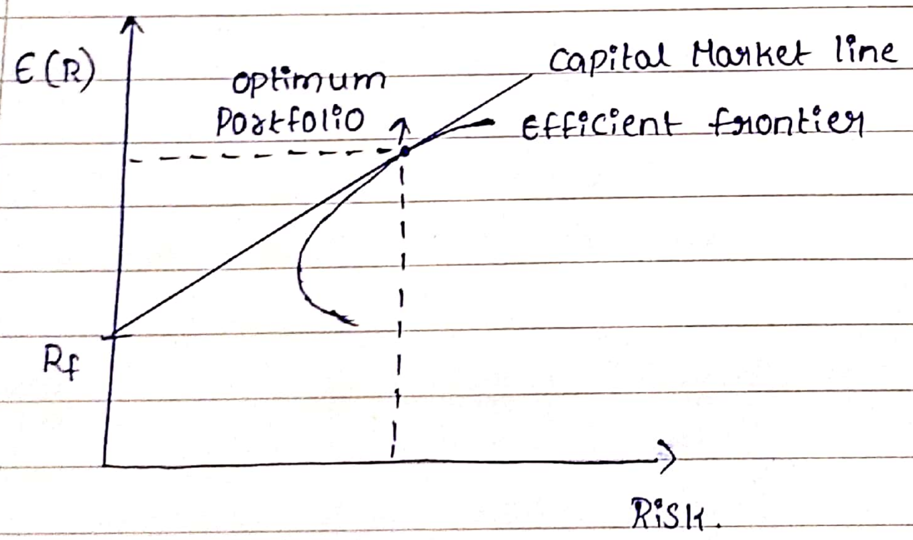
It assumes no friction, meaning investors can buy and sell securities freely without tax implications or costs.

⑨ Markowitz portfolio Model

This model used to create and select a portfolio that would yield maximized returns.

→ Efficient Frontier :

- a graphical representation of all possible combinations of risky securities for an optimal level of return given a particular level of risk.
- A portfolio found on the upper portion of the curve is efficient, as it gives the maximum expected return for the given level of risk.



$$CML = R_f + (R_m - R_f)\frac{\sigma_p}{\sigma_m}.$$

(10) Weight (A) $= \frac{\sigma_B^2 - COV_{A,B}}{\sigma_A^2 + \sigma_B^2 - 2COV_{A,B}}$

(11) Sharpe Ratio $= \frac{R_p - R_f}{\sigma_p}$

- Risk-adjusted return per unit of risk.

(12) Trynor's Ratio $= \frac{R_p - R_f}{\beta}$

- Measures Return per unit of Risk.

(13) Jensen's Alpha = Actual return - Expected return (E(R))

- +ve Alpha suggests that the porfolio outperformed its risk-adjusted expectations. & vice verca.

Questions.

Ques 1 29 - Aug

Ans Assuming the given data is a Sample.

Day	(x) ABC %	(y) XYZ %	$(x-\bar{x})$	$(y-\bar{y})$	$(x-\bar{x})(y-\bar{y})$
1	1.1	3	-0.2	-0.74	0.148
2	1.7	4.2	0.4	0.46	0.184
3	2.1	4.9	0.8	1.16	0.928
4	1.4	4.1	0.1	0.36	0.036
5	0.2	2.5	-1.1	-1.24	1.331
	$\Sigma x = 6.5$	$\Sigma y = 18.7$			$Z = 2.627$
	$\Sigma \bar{x} = 1.3$	$\Sigma \bar{y} = 3.74$			

$$COV = \frac{Z}{n-1} = \frac{2.627}{5-1} = 0.657.$$

Ques 2 29 - Aug Ex-1

Ans

Day	x	y	$x-\bar{x}$	$y-\bar{y}$	$(x-\bar{x})(y-\bar{y})$
1	1.8	2.5	0.2	-1.02	-0.204
2	1.5	4.3	-0.1	0.78	-0.078
3	2.1	4.5	0.5	0.98	0.49.
4	2.4	4.1	0.8	0.58	0.464
5	0.2	2.2	-1.4	-1.32	1.848
	$\bar{x} = 1.6$	$\bar{y} = 3.52$			2.102

$$COV = \frac{2.102}{4} = 0.525$$

Ques 3 29-Aug

Ans $w_A = 0.6, \quad r_A = 20\% \quad \sigma_A = 10.$
$w_B = 0.4, \quad r_B = 12\% \quad \sigma_B = 16.$
$\rho = 0.6.$

weighted average $= w_1 r_1 + w_2 r_2$
$= (0.6)(20) + (0.4)(12)$
$= 12 + 4.8$
$= 16.8$

$$\rho = \frac{COV_{AB}}{\sigma_A \sigma_B}$$

$$0.6 = \frac{COV_{AB}}{10 \times 16}$$

$COVAB = 0.6 \times 10 \times 16$
$COVAB = 96$

Standard deviation:

$\sigma = \sqrt{w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2 w_1 w_2 COV_{12}}$

$= \sqrt{(0.6)^2 (10)^2 + (0.4)^2 (16)^2 + 2(0.6)(0.4)(96)}$

$= \sqrt{36 + 40.96 + 46.08}$

$= \sqrt{123.04}$

$\sigma = 11.09.$

Ques 4 29-Aug

Ans

X	Y
$w_1 = 30\%$	$w_2 = 70\%$
$\sigma_1 = 21\%$	$\sigma_2 = 8\%$

$\rho = 0.347$

$COV = 0.347 \times 21 \times 8$

$COV = 58.296$

$$\sigma = \sqrt{(0.3)^2(21)^2 + (0.7)^2(8)^2 + 2(0.3)(0.7)(58.296)}$$

$$= \sqrt{39.69 + 31.36 + 24.48432}$$

$$\sigma = 9.77$$

Ques 5 29-Aug

Ans

$w_1 = 0.25$ $\quad w_2 = 0.35$ $\quad w_3 = 0.40$

$\sigma_1 = 17$ $\quad \sigma_2 = 12$ $\quad \sigma_3 = 9$

$\rho_{AB} = 0.683$ $\quad \rho_{AC} = -0.271$ $\quad \rho_{BC} = 0.425$

$COV_{AB} = 0.683 \times 17 \times 12 = 139.33$

$COV_{AC} = -0.271 \times 17 \times 9 = -41.46$

$COV_{BC} = 0.425 \times 12 \times 9 = 45.9$

$$\sigma = \sqrt{w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + w_3^2\sigma_3^2 + 2w_1w_2COV_{AB} + 2w_1w_3COV_{AC} + 2w_2w_3COV_{BC}}$$

$$= \sqrt{(0.25)^2(17)^2 + (0.35)^2(12)^2 + (0.4)^2(9)^2 + 2(0.25)(0.35)(\overset{139.33}{\cancel{0.683}}) + 2(0.25)(0.40)(-41.46) + 2(0.35)(0.40)(45.9)}$$

$= \sqrt{18.0625 + 17.64 + 12.96 + 24.38 + (-8.292) + 12.85}$

$= \sqrt{77.61}$

$\sigma = 8.81$

Ques 6 05-Sep - 69

Ans $r_A = 16$ $r_B = 12$
$\sigma_A = 15$ $\sigma_B = 8$
$\rho = 0.60.$

(a) Covariance $= 0.60 \times 15 \times 8.$
$= 72.$

(b) $w_A = 0.6$ $w_B = 0.4.$

$r = 0.6 \times 16 + 0.4 \times 12.$
$r = 14.4.$

$\sigma = \sqrt{(0.6)^2 (15)^2 + (0.4)^2 (8)^2 + 2(0.6)(0.4)(72)}$

$= \sqrt{81 + 10.24 + 34.56.}$

$= \sqrt{125.8}$

$\sigma = 11.21$

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Ques 7 05 sep - 39

Ans $w_1 = 0.3$ $w_2 = 0.5$ $w_3 = 0.2$

$\sigma_1 = 6$ $\sigma_2 = 9$ $\sigma_3 = 10$

$\rho_{12} = 0.4$ $\rho_{13} = 0.6$ $\rho_{23} = 0.7.$

$$\sigma = \sqrt{(0.3)^2(6)^2 + (0.5)^2(9)^2 + (0.2)^2(10)^2 + 2(0.3)(0.5)(6)(9)(0.4) + 2(0.3)(0.2)(6)(10)(0.6) + 2(0.5)(0.2)(9)(10)(0.7)}$$

$$= \sqrt{3.24 + 20.25 + 4 + 6.48 + 4.32 + \cancel{18.9}\ 12.6.}$$

$\sigma = 7.13$

Ques 8 10 sep - 29

Ans

a)

P	A_1	A_2	$(A_1 - \bar{A}_1)$	$(A_2 - \bar{A}_2)$	$P(A_1 - \bar{A}_1)^2$	$P(A_2 - A_2)^2$
0.10	5	0	-8	-14	6.4	19.6.
0.30	10	8	-3	-6	2.7.	10.3.
0.50	15	18	2	4	2	8.
0.10	20	26	7	12	4.9	14.4
	$\bar{A}_1 = 13$	$\bar{A}_2 = 14$			$\sigma_{A_1}^2 = 16$	$\sigma_{A_2}^2 = 52.3$
					$\sigma_{A_1} = 4$	$\sigma_{A_2} = 7.23$

$P(A_1 - \bar{A}_1)(A_2 - \bar{A}_2)$

11.2

5.4

4

8.4

$COV_{A_1 A_2} = 29$

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a) $\sigma_{A_1} = 4$, $\sigma_{A_2} = 7.23$.

b) Covariance = 29

c) correlation $= \dfrac{cov}{\sigma_{A_1} \sigma_{A_2}}$

$= \dfrac{29}{4 \times 7.23}$.

Correlation = 1.002

Ques 9 12 Sep - 39

Ans

P	x	y	$(x-\bar{x})$	$(y-\bar{y})$	$P(x-\bar{x})^2$	$P(y-\bar{y})^2$
0.25	6.50	-11.50	-5.05	-25.87	6.37	167.31
0.45	11.75	15.	0.2	0.63	0.0418	0.18
0.30	15.45	35	3.9	20.63	4.563	127.68

$\bar{x} = 11.55$ $\bar{y} = 14.37$ $\sigma_x^2 = 10.951$ $\sigma_y^2 = 295.17$

$\sigma_x = 3.31$ $\sigma_y = 17.18$.

Firm Alpha Tech is likely to give a better average return of Alpha Tech is riskier comparatively.

Ques 10 19 Sep

Ans (i)

P	Y	Z	$Y-\bar{Y}$	$Z-\bar{Z}$	$P(Y-\bar{Y})^2$	$P(Z-\bar{Z})^2$
0.20	22	5	10	-10	20	20
0.60	14	15	2	0	2.4	0
0.20	-4	25	-16	10	51.2	20
	$\bar{Y}=12$	$\bar{Z}=15$			$\sigma_y^2 = 73.6$	$\sigma_z^2 = 40$
					$\sigma_y = 8.58$	$\sigma_z = 6.32$

$P(Y-\bar{Y})(Z-\bar{Z})$
-20
0
-32
-52

(ii) ~~Yes, Y comparatively~~

Co-efficient of variation of Y = $\frac{8.58}{12} = 0.715$

Co-efficient of variation of Z = $\frac{6.32}{15} = 0.421$.

No, Z is comparatively less risky.

(iii) If financial analyst invests equal amounts in Y & Z then weights of Y & Z would be 0.5 each
cov (Y,Z) = -52

$\sigma = \sqrt{(0.5)^2(73.6) + (0.5)^2(40) + 2(0.5)(0.5)(-52)}$

$\sigma = \sqrt{18.4 + 10 + (-26)}$

$\sigma = \sqrt{2.4}$

$\sigma = 1.55\%$

Hence, the financial analyst invest equal amounts.

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Ques 11 23-Sep

Ans $r_p = 13$ $r_Q = 16$.

$\sigma_p = 4$ $\sigma_Q = 7$

$w_p = 30\%$. $w_Q = 70\%$

(i) Expected return of portfolio $= 0.3 \times 13 + 0.7 \times 16$

$= 3.9 + 11.2$

$= 15.1\%$.

(ii) Minimum risk

So, correlation $= -1$

$$-1 = \frac{cov}{4 \times 7}$$

$$cov = -28.$$

$$\sigma = \sqrt{(0.3)^2(4)^2 + (0.7)^2(7)^2 + 2(0.3)(0.7)(-28)}$$

$$= \sqrt{1.44 + 24.01 + (-11.76)}$$

$$= \sqrt{13.69}$$

$\sigma = 3.7\%$.

(iii) Maximum risk, $cov = 28$.

$$\sigma = \sqrt{1.44 + 24.01 + 11.76}$$

$$\sigma = \sqrt{37.21}$$

$\sigma = 6.1\%$.

Ques 12 24-Sep

Ans

P	x	$(x-\bar{x})$	$P(x-\bar{x})^2$
0.2	-40	-50.5	510.05
0.1	-15	-25.5	~~22.5~~ 65.025
0.3	12	1.5	0.675
0.2	30	19.5	76.05
0.2	52	41.5	344.45
	$\bar{x} = 10.5$		$\sigma_x^2 = 996.25$

$\sigma_x = 31.56$

coefficient of variation $= \frac{\sigma_x}{\bar{x}} = \frac{31.56}{10.5} = 3.005.$

Ques 13 26-Sep-9.48

Ans $\sigma_A^2 = 13$ $\quad \sigma_B^2 = 15$

$r_A = 15$ $\quad r_B = 18$

$COV(A,B) = 3$

$W_A = 70$ $\quad W_B = 30$

Return of the portfolio $= (0.70)(15) + (0.30)(18)$

$= 10.5 + 5.4$

$= 15.9\%$

Risk of the porfolio =

$\sigma = \sqrt{(0.7)^2(13) + (0.3)^2(15) + 2(0.7)(0.3)(3)}$

$= \sqrt{6.37 + 1.35 + 1.26.} = \sqrt{8.98}$

$\sigma = 2.99\%$

Ques 14 26-Sep 9.49.

Ans $r_1 = 14$ $r_2 = 22$
$\sigma_1 = 7$ $\sigma_2 = 10$
$w_1 = 40\%$ $w_2 = 60\%$.

(i) If correlation = 1

COV = $1 \times 7 \times 10$.
COV = 70.
Expected return = $0.4 \times 14 + 0.6 \times 22$
= 18.8 %.
Risk $\sigma = \sqrt{(0.4)^2(7)^2 + (0.6)^2(10)^2 + 2(0.4)(0.6)(70)}$

$= \sqrt{7.84 + 36 + 33.6}$.
$\sigma = 8.8\%$.

(ii) If correlation = 0.
then COV = 0.
Return = 18.8%.
Risk = $\sqrt{7.84 + 36 + 0}$.
$\sigma = 6.62\%$.

(iii) If correlation = -1
then COV = -70.
$\sigma = \sqrt{7.84 + 36 - 33.6}$.
$\sigma = 3.2\%$.

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Ques 15 26-Sep

Ans

P	A	B	$(A-\bar{A})$	$(B-\bar{B})$	$P(A-\bar{A})^2$	$P(B-\bar{B})^2$	$P(A-\bar{A})(B-\bar{B})$
0.3	22	6	7	-3	14.7	2.7	-6.3
0.5	14	10	-1	1	0.5	0.5	-0.5
0.2	7	11	-8	2	12.8	0.8	-3.2
	$\bar{A}=15$	$\bar{B}=9$			$\sigma_A^2=28$	$\sigma_B^2=4$	$-10 = COV_{AB}$
					$\sigma_A=5.3$	$\sigma_B=2$	

Ques 16. 30-Sep

Ans.

P	G	M	$(G-\bar{G})$	$(M-\bar{M})$	$P(M-\bar{M})^2$	$P(G-\bar{G})(M-\bar{M})$
0.3	10	12	-2	-3	2.7	1.8
0.4	12	15	0	0	0	0
0.3	14	18	2	3	2.7	1.8
	$\bar{G}=12$	$\bar{M}=15$			$\sigma_m^2=5.4$	3.24

$$\beta = \frac{COV_{AM}}{\sigma_m^2} = \frac{3.24}{5.4} = 0.6$$

Ques 17 30-Sep-9.10

Ans

$\bar{S}=10$, $\bar{M}=13$

$\sigma_S=18$ $\sigma_M=15$

$\rho=0.8$

$COV_{SM} = 0.8 \times 18 \times 15$

$COV_{SM} = 216$

$\cancel{\beta = \frac{225}{216}}$ $\beta = \frac{216}{225}$

$\beta = 0.96$

$\sigma_M^2 = (15)^2 = 225$

$\therefore$ The given security is defensive

Ques 18 30-sep-9.9

Ans

A	M	$(A-\bar{A})$	$(M-\bar{M})$	$(M-\bar{M})^2$	$(A-\bar{A})(M-\bar{M})$
10	15	-4.6	-1	1	4.6
18	12	3.4	-4	16	-13.6
14	18	-0.6	2	4	-1.2
20	16	5.4	0	0	0
11	19	-3.6	3	9	-10.8
$\bar{A}=14.6$	$\bar{M}=16$			$\sigma_m^2=6$	COV = -4.2

$$\beta = \frac{-4.2}{6} = -0.7$$

Ques 19 01-Oct-9.1

Ans (i) 50% in A & 50% in B.

$r_A = 15\%$, $r_B = 9\%$

$\sigma_A = 5.3\%$ $\sigma_B = 2\%$

$\rho = -0.94$

$COV_{AB} = -0.94 \times 5.3 \times 2 = -9.964$

Return $= 0.50 \times 15 + 0.50 \times 9$

$= 7.5 + 4.5$

$= 12\%$

Risk $= \sqrt{(0.5)^2(5.3)^2 + (0.5)^2(2)^2 + 2(.5)(.5)(-9.964)}$

$= \sqrt{7.0225 + 1 - 4.982}$

$= \sqrt{3.0405}$

Risk $= 1.74\%$

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(ii) 20% in A and 80% in B.

Return = $0.2 \times 15 + 0.8 \times 9$
$= 10.2\%$

Risk = $\sqrt{(0.2)^2 (5.3)^2 + (0.8)^2 (2)^2 - 4.982 - 2(.2)(.8)(9.964)}$
$= \sqrt{1.1236 + 2.56 - 4.982 - 3.188}$
$= \sqrt{0.4956}$

Risk = 0.7%

(iii) 80% in A and 20% in B.

Return = $0.8 \times 15 + 0.2 \times 9$
$= 13.8\%$

Risk = $\sqrt{(0.8)^2 (5.3)^2 + (0.2)^2 (2)^2 + 2(0.8)(0.2)(-9.964)}$
$= \sqrt{17.9776 + 0.16 + (-3.188)}$
$= \sqrt{14.95}$

Risk = 3.86%

Ques 20 03-Oct-9.11

Ans Actual return $\bar{P} = 12$, $\bar{Q} = 16$
$\beta_1 = 0.7$, $\beta_2 = 1.3$.

$R_f = 5$, $R_m = 15$

$E(R) = R_f + \beta(R_m - R_f)$

$E(R)$ of P = $5 + 0.7(15-5)$

$E(R) = 12\%$ efficiently priced.

Q $E(R) = 5 + 1.3(15-5)$

$E(R) = 18\%$ over valued.

∴ Only portfolio P lies on SML.

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Ques 21) 03-Oct - 9.39.

Ans

A $E(R) = 7 + 2(15-7)$

$E(R) = 23$ under priced.

B $E(R) = 7 + 1.5(15-7)$

$E(R) = 19$ under priced.

C $E(R) = 7 + 1(15-7)$

$E(R) = 15$ under priced.

D $E(R) = 7 + 0.8(15-7)$

$E(R) = 13.4$ over priced.

E $E(R) = 7 + 0.5(15-7)$

$E(R) = 11$ over priced.

∴ The Securities A,B,C are underpriced.

Ques 22 03-Oct - 9.19.

Ans

	P	Q
E(R)	13	16
σ	4	7.
w	0.30	0.70.

(i) Expeted return $= 0.3 \times 13 + 0.7 \times 16$

$= 15.1\%$

(ii) Minimum risk.

$$\sigma = \sqrt{(0.3)^2(4)^2+(0.7)^2(7)^2+2(0.3)(0.7)(4)(7)(-1)}$$

$$= \sqrt{1.44+24.01+(-11.76)}$$

$$= \sqrt{13.69}$$

$$\sigma = 3.7.$$

(iii) Maximum risk.

$$\sigma = \sqrt{(0.3)^2(4)^2+(0.7)^2(7)^2+11.76.}$$

$$= \sqrt{37.21}$$

$$\sigma = 6.1$$

Ques 23 03-Oct

Ans

	Exp. Return	σ	w
A	20	24	0.50
B	12	16	0.50

(i) if standard deviation of the portfolio is 18%

$$18 = \sqrt{(0.5)^2(24)^2+(0.5)^2(16)^2+2(0.5)(0.5)(COV)}$$

$$324 = 144+64+0.5\,COV$$

$$0.5\,COV = 116.$$

$$COV = 232$$

$$\rho = \frac{232}{24 \times 16}$$

$$\rho = 0.604.$$

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If standard deviation of the portfolio is 15

$15 = \sqrt{(0.5)^2(24)^2+(0.5)^2(16)^2+2(0.5)(0.5)(24)(16)\rho}$

$225 = 144+64+192\rho$

$\rho = 0.088.$

(ii) $W_A = 0.25$ $W_B = 0.75$, $\rho = 1$

$\sigma = \sqrt{(0.25)^2(24)^2+(0.75)^2(16)^2+2(0.25)(0.75)(24)(16)(1)}$

$= \sqrt{36+144+144}$

$\sigma = 18.$

Ques 24 03 Oct - 9.9

Ans if A & B as 75% + 25%.

$R = 0.75 \times 10 + 0.25 \times 12$

$R = 10.5\%$

$\sigma = \sqrt{(0.75)^2(20)^2+(0.25)^2(25)^2+2(0.75)(0.25)(20)(25)(0.5)}$

$= \cancel{\sqrt{56.25+9+22.5}}$ $= \sqrt{225+39.0625+93.75}$

$= \sqrt{357.8125}$

~~$\sigma = 9.36\%$~~

$\sigma = 18.9\%$

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If A and B as 25% + 75%

$R = 0.25 \times 10 + 0.75 \times 12$
$R = 11.5\%$

$\sigma = \sqrt{(0.25)^2(20)^2 + (0.75)^2(25)^2 + 2(0.25)(0.75)(20)(25)(0.5)}$

$= \sqrt{25 + 351.56 + 93.75}$

$\sigma = 21.68\%$

co-efficient of variation for A = $\frac{10.5}{18.9} = 0.55$

co-efficient of variation for B = $\frac{11.5}{21.68} = 0.53$

∴ The investor should consider 75% + 25%.

Ques 25 04-Oct-9.31

Ans

$R_f = 4.5$
$R_m = 17$
$\beta = 1.1$
Actual return of security L = 20%.

$E(R) = 4.5 + 1.1(17 - 4.5)$
$E(R) = 18.25$

Here E(R) is less than actual return, so the security L is under priced.

$E(R) = 22.5$

$22.5 = 4.5 + \beta(17 - 4.5)$

$12.5\beta = 18.$

$\beta = \frac{18}{12.5}$

$\beta = 1.44.$

Ques 26 07-Oct-9:33

Ans $R_f = 7.$
$R_m = 10.$

$\beta = 1$
$E(R) = 7 + 1(10-7) = 10.$

$\beta = 1.25$
$E(R) = 7 + 1.25(10-7) = 10.75.$

$\beta = 1.70.$
$E(R) = 7 + 1.70(10-7) = 12.1$

$\beta = 1.50.$
$E(R) = 7 + 1.50(10-7) = 11.5.$
$\beta = 1.60$
$E(R) = 7 + 1.60(10-7) = 11.8.$

Ques 27 07-Oct-9.45

Ans $R_m = 0.13$

$R_f = 0.09$

$E(R)A = 0.09 + 1.7(0.13 - 0.09)$

$E(R)A = 0.158$ under priced.

$E(R)\ B = 0.09 + 1.4(0.13 - 0.09)$

$E(R) = 0.146$ over priced.

$E(R)\ C = 0.09 + 1.1(0.13 - 0.09)$

$E(R) = 0.134$ under priced.

$E(R)\ D = 0.09 + 0.95(0.13 - 0.09)$

$E(R) = 0.128$ over priced.

$E(R)\ E = 0.09 + 1.05(0.13 - 0.09)$

$E(R) = 0.132$ under priced.

$E(R)\ F = 0.09 + 0.7(0.13 - 0.09)$

$E(R) = 0.118$. under priced.

Ques 28 10-Oct-9.27.

Ans $R_f = 5$ $R_m = 18$ $\sigma_m = 10$.

$\sigma_P = 5$ $\sigma_Q = 8$ $\sigma_R = 15$

β

$$CML = R_f + (R_m - R_f)\frac{\sigma_p}{\sigma_m}$$

$CML_P : 5 + (18-5)\frac{5}{10}$

$CML_P = 11.5\%$ Efficiently priced.

$CML_Q = 5 + (18-5)\frac{8}{10}$

$CML_Q = 15.4\%$ inefficiently priced.

$CML_R = 5 + (18-5)\frac{15}{10}$

$CML_R = 24.5\%$ inefficiently priced.

Ques 29 10-oct-9.14

Ans

A	M	$(A-\bar{A})$	$(M-\bar{M})$	$(M-\bar{M})^2$	$(A-\bar{A})(M-\bar{M})$
15	18	0.6	1.4	1.96	0.84
12	17	-2.4	0.4	0.16	-0.96
14	18	-0.4	1.4	1.96	-0.56
20	11	5.6	-5.6	31.36	-31.36
11	19	-3.4	2.4	5.76	-8.16
$\bar{A} = 14.4$	$\bar{M} = 16.6$			$\sigma_m^2 = 8.24$	$\frac{-40.2}{5} = -8.04$

$\beta = \frac{-8.04}{8.24} = -0.97$

Ques 30 10-Oct-9.11

Ans Calculating the optimal weights

$$W_A = \frac{\sigma_B^2 - COV_{AB}}{\sigma_A^2 + \sigma_B^2 - 2COV_{AB}}$$

$$= \frac{12-3}{13+12-2(3)}$$

$W_A = 0.47$

$W_B = 1 - 0.47$

$W_B = 0.53$

$$\sigma = \sqrt{(0.47)^2 13 + (0.53)^2 12 + 2(0.47)(0.53)(3)}$$

$$\cancel{37.33} + \sqrt{2.87 + 3.37 + 1.49}$$

$$\sigma = \sqrt{7.73}$$

$$\sigma = 2.78$$

Ques 31 10-Oct-9.13.

Ans $\sigma_X = 13$ $R_m = 18$

$\sigma_Y = 16$ $R_f = 5$

$\sigma_Z = 25$

$\sigma_M = 15$

/ /

* $CML_X = 15 + (18-15)\frac{13}{15}$

$CML_X =$ ~~7.59%~~ 17.59 inefficiently priced.

$CML_Y = 15 + (18-15)\frac{16}{15}$

$CML_Y =$ ~~8.19%~~ 18.19 inefficiently priced.

$CML_Z = 15 + (18-15)\frac{25}{15}$

$CML_Z =$ ~~9.99%~~ 19.99 inefficiently priced.

Ques32 10-Oct 9.46.

Ans

$R_m = 18.$, $R_f = 7.$

$\sigma_m = 10.$

$\sigma_A = 30$

$\sigma_B = 18$

$\sigma_C = 16.$

$CML_A = 7 + (18-7)\frac{30}{10}$

$CML_A = 40\%$ inefficient

$CML_B = 7 + (18-7)\frac{18}{10}$

$CML_B = 26.8.$ inefficient

$CML_C = 7 + (18-7)\frac{16}{10}$

$CML_C = 24.6.$ inefficient.

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Ques 33 16-Oct - 10.11

Ans

$$\text{Sharpe Ratio} = \frac{R_p - R_f}{\sigma_p}, \quad R_f = 10$$

~~Mutual Fund~~ ~~Return~~ ~~Risk~~

Mutual Fund	Sharpe Ratio	Ranking	performance
A	$\frac{13-10}{16} = 18.75$	5	underperformed
B	$\frac{17-10}{23} = 30.43.$	2	out performed
C	$\frac{23-10}{39} = 33.33$	1	out performed
D	$\frac{15-10}{25} = 20$	4	underperformed.
Market	$\frac{14.5-10}{20} = 22.5$	3	

compared ~~w~~sharpe ratio with market to find out the performance.

$$\text{Treynor's Ratio} = \frac{R_p - R_f}{\beta}$$

MF	TR	Ranking	Performance
A	2.7	5	under performed.
B	8.14	2	out performed
C	10.83	1	out performed.
D	3.62	4	under performed.
Market	4.5	3	

Fund C is the best performer. Since Rankings are same in both ratios, all funds are well diversified.

Ques 34 16-Oct-10.5

Ans $R_m = 22$, $\sigma_m = 25$, $R_f = 5$

Sharpe Ratio :

MF	SR	Rank	Performance
X	0.42	4	U.P
Y	0.7	1	O.P
Z	0.65	3	UP
Market	0.68	2	

Treynor's Ratio :

MF	TR	Rank	performance
X	12.85	4	U.P
Y	17.5	1	O.P
Z	16.52	3	U.P
Market	17	2	

Jensen's Alpha : $AR - [R_f + \beta(R_m - R_f)] = \alpha$

MF	AR	β	E(R)	α	Rank	Performance
X	14	0.7	16.9	-2.9	4	U.P
Y	26	1.2	25.4	0.6	1	O.P
Z	24	1.15	24.55	-0.55	3	U.P.
Market	22	1	22	0	2	

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Ques 35 16-Oct-9.16.

Ans P	L	M	$L-\bar{L}$	$M-\bar{M}$	$P(L-\bar{L})^2$	$P(M-\bar{M})^2$
0.2	6	12	-5	-3.3	5	2.178
0.5	10	15	-1	-0.3.	0.5	0.045
0.3	16	18	5	2.7	5	2.187
	$\bar{L}=11$	$\bar{M}=15.3$			$\sigma_p^2=10.5$	$\sigma_m^2=4.41$

$P(L-\bar{L})(M-\bar{M})$
3.3.
0.15
4.05
COV = 7.5

(i) Mean return of L = 11 %
Mean return of M = 15.3 %.

(ii) variance of L = 10.5 %

(iii) variance of Market = 4.41 %

(iv) β of L $= \frac{7.5}{4.41} = 1.7$

Ques 36. 17-Oct-9.23

Ans:

P	A	B	$P(A-\bar{A})^2$	$P(B-\bar{B})^2$
0.2	7	4	3.2.	16.2.
0.4	9	10	1.6.	3.6.
0.3	14	18	2.7.	7.5
0.1	18	28	4.9.	22.5
	$\bar{A}=11$	$\bar{B}=13$	$\sigma_A^2=12.4.$	$\sigma_B^2=49.8.$

(i) $\bar{A}=1$, $\bar{B}=13$.

(ii) $\sigma_A^2=12.4$, $\sigma_A=3.52$.

$\sigma_B^2=49.8$ $\sigma_B=7.05$

Ques 37. 17-Oct-9.40.

Ans

P	A	B	M	$A-\bar{A}$	$B-\bar{B}$	$M-\bar{M}$	$P(M-\bar{M})^2$
0.2	10	6	10	-5.8.	-12.3.	-7.9.	12.48
0.4	12	15	16	-3.8.	-3.3.	-1.9	1.44
0.3	21	27	22	5.2.	8.7.	4.1	5.04
0.1	27	30	29.	11.2.	11.7.	11.1	12.32
	$\bar{A}=15.8$	$\bar{B}=18.3$	$\bar{M}=17.9.$				$\sigma_m^2=31.28$

$P(A-\bar{A})(B-\bar{B})$	$P(A-\bar{A})(M-\bar{M})$	$P(B-\bar{B})(M-\bar{M})$
14.27.	9.16	19.43.
5.01	2.88	2.50.
13.57.	6.39	10.70.
13.10	12.43.	12.98.
$COV_{AB}=45.95$	$COV_{AM}=30.86.$	$COV_{BM}=45.61.$

(i) $COV_{AB} = 45.95$

(ii) β of $A = \frac{COV_{AM}}{\sigma_m^2}$

$= \frac{30.86}{31.28}$

β of $A = 0.98$

(iii) β of $B = \frac{COV_{BM}}{\sigma_m^2}$

$= \frac{45.61}{31.28}$

β of $B = 1.45$

Ques 38 18-Oct-8.27.

Ans $R_f = 12\%$. growth rate $= 12\%$.

$\beta = 1.8$

$R_m = 17$.

$D_0 = 3 \rightarrow D_1 = 3 + 012\% \rightarrow D_1 = 3.36$.

$E(R) = 12 + 1.8(17 - 12)$

$E(R) = 21$

Value of the share $= \frac{3.36}{21 - 12}$ $\frac{D_1}{R - g}$

$= 37.3\%$

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Ques 39 18-Oct - 9.42

Ans Covariance = $-0.3 \times 20 \times 35$

COV. $= -210$.

$$W_F = \frac{1225+210}{400+1225+\cancel{2440}+420}$$

$$= \frac{1435}{2045}$$

$W_F = 0.7$.

$W_G = 0.3$.

$E(R) = 0.7 \times 10 + 0.3 \times 25$.

$E(R) = 14.5\%$.

~~$\sigma = \sqrt{(0.7)}$~~

Ques 40 18-Oct - 9.38.

Ans

P	S	G	$P(S-\bar{S})^2$	$P(G-\bar{G})^2$	$P(S-\bar{S})(G-\bar{G})$
0.2	15	16	3.2	1.568	1.92
0.25	16	10	6.25	3.24	-4.5
0.3	-10	28	132.3	62.208	-90.72
0.25	28	-2	72.25	60.84	-66.3
	$\bar{S}=11$	$\bar{G}=13.6$	$\sigma_S^2=214$	$\sigma_G^2=127.8$	-159.6

(i) $\sigma_S = 14.63$ $\sigma_G = 11.30$

/ /

(ii) Return $= 0.5 \times 11 + 0.5 \times 13.6$

$= 12.3\%$

Risk $= \sqrt{(0.5)^2(214) + (0.5)^2(127.8) + 2(0.5)(0.5)(-159.6)}$

$= \sqrt{53.5 + 31.95 + (-79.8)}$

$= \sqrt{5.65}$

$\sigma = 2.37\%$

(iii) $\rho = -1 \Rightarrow COV = -1 \times 14.63 \times 11.30 = -165.32$

$W_{AS} = \dfrac{127.8 + 165.32}{214 + 127.8 + 165.32 \times 2}$

$= \dfrac{\cancel{293.12}}{\cancel{507.12}} = \dfrac{293.12}{672.44}$

~~$W_S = 0.57 = 57\%$~~

~~$W_G = 0.43 = 43\%$~~

$W_S = 43\%$

$W_G = 57\%$

∴ when $\rho = -1$, then the mimumum risk portfolio of 43% of S & 57% of G.

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Ques 41 21-Oct-9.37

Ans

P	Alpha (x)	Omega (y)	Market	$(x-\bar{x})$	$(y-\bar{y})$
0.3	21	23	22	16.3	17.7
0.2	12	17	18	7.3	11.7
0.5	-8	-10	-9	-12.7	-15.3
	$\bar{x} = 4.7$	$\bar{y} = 5.3$	$\bar{M} = 5.7$		

$(M-\bar{M})$	$P(M-\bar{M})^2$	$P(x-\bar{x})(M-\bar{M})$	$P(y-\bar{y})(M-\bar{M})$
16.3	79.707	79.707	86.553
12.3	30.258	179.58	28.782
-14.7	108.045	93.345	112.455
	$\sigma_m^2 = 218.01$	$cov_{xM} = 191.01$	$cov_{yM} = 227.79$

β of Alpha $= \frac{191.01}{218.01} = 0.87$

β of Omega $= \frac{227.79}{218.01} = 1.04$

$R_f = 3$

$E(R)$ of Alpha $= 3 + 0.87(5.7-3)$
$= 5.35$

$E(R)$ of Omega $= 3 + 1.04(5.7-3)$
$= 5.808$

The investor should exit from those stocks as both are over valued and under performed.

Ques 42 21-Oct-9.51

Ans $w_A = 40$ $w_B = 60$

$R_A = 15$ $R_B = 18$

$\sigma_A = 20$ $\sigma_B = 14$

(i) $\sigma_P = 14$

$$14 = \sqrt{(0.4)^2(20)^2 + (0.6)^2(14)^2 + 2(0.4)(0.6)\, cov_{AB} (20)(14)(\rho)}$$

$$14 = \sqrt{64 + 70.56 + 134.4\rho}$$

$$196 = 134.56 + 134.4\rho$$

$$134.4\rho = 61.44$$

$$\rho = \frac{61.44}{134.4}$$

$$\rho = 0.46$$

(ii) $E(R) = 0.3 \times 15 + 0.7 \times 18 = 17.1\%$

$$\sigma = \sqrt{(0.3)^2(20)^2 + (0.7)^2(14)^2 + 2(0.3)(0.7)(20)(14)(1)}$$

$$= \sqrt{36 + 96.04 + 117.6}$$

$$\sigma = \sqrt{249.64}$$

$$\sigma = 15.8\%$$

Scanned with OKEN Scanner

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Ques 43. 24-Oct.

Ans Assuming it as a sample data.

x	M	$(x-\bar{x})$	$(M-\bar{M})$	$(x-\bar{x})^2$	$(M-\bar{M})^2$	$(x-\bar{x})(M-\bar{M})$
25	22	0	3	0	9	0
27	20	2	1	4	1	2
26	17	1	-2	1	4	-2
22	16	-3	-3	9	9	9
25	20	0	1	0	1	0
$\bar{x}=25$	$\bar{M}=19$			$\sigma_x^2 = 3.5$	$\sigma_m^2 = 6$	$COV_{AM} = 2.25$

$$\beta = \frac{2.25}{6} = 0.375$$

Systamtic risk = $\beta^2 \sigma_m^2$

$= (0.375)^2 6.$

$= 0.84$

Total risk = 3.5

unsystematic risk = $3.5 - 0.84 = 2.66$

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Ques 44 24-Oct-(07-40)

Ans $R_f = 10$, $R_m = 15$

$E(R) = R_f + \beta(R_m - R_f)$

Hind zinc $= 10 + 1.3(15-10)$
$= 16.5$ under valued.

Asian paints $= 10 + 0.8(15-10)$
$= 14$ under valued.

Maruti udyog $= 10 + 1.1(15-10)$
$= 15.5$ correctly priced.

Purvi Electronics $= 10 + 1.7(15-10)$
$= 18.5$ over valued.

Ques 45 24-oct.

Ans

P	C	M	$C-\bar{C}$	$M-\bar{M}$	$P(C-\bar{C})^2$	$P(M-\bar{M})^2$	$P(C-\bar{C})(M-\bar{M})$
0.2	15	10	-4	-8	3.2	12.8	6.4
0.4	14	16	-5	-2	10	1.6	4
0.4	26	24	7	6	19.6	14.4	16.8
	$\bar{C}=19$	$\bar{M}=18$			$\sigma_C^2 = 32.8$	$\sigma_m^2 = 28.8$	$cov_{CM} = 27.2$
					$\sigma_C =$	$\sigma_M = 5.36$.	

a) $R_C = 19$, $R_M = 18$

b) $\sigma_C = 5.73$, $\sigma_M = 5.36$

c) Covariance $= 27.2$

d) $\cancel{ro} = \frac{27.2}{5.73 \times 5.36} = \frac{27.2}{30.0971} = \cancel{2.45}\ 0.88.$

e) $\beta = \frac{27.2}{28.8} = 0.94.$

Ques 46. 24-Oct

Ans

A	B	M	$A-\bar{A}$	$B-\bar{B}$	$M-\bar{M}$	$(M-\bar{M})^2$
13	11	12	1.6	0.7	1.4	1.96
11.5	10.5	11	0.1	0.2	0.4	0.16
9.8	9.5	9	-1.6	-0.8	-1.6	2.56

$\bar{A}=11.4$ $\bar{B}=10.3$ $\bar{M}=10.6$ $\sigma_m^2=1.56$

$(A-\bar{A})(M-\bar{M})$	$(B-\bar{B})(M-\bar{M})$
2.24	0.98
0.04	0.08
2.56	1.28

COV_A 1.61 COV_B 0.78

β of $A = \frac{1.61}{1.56} = 1.03$

β of $B = \frac{0.78}{1.56} = 0.5$

Ques 47. 04 - NOV

Ans

P	A	P	B	$P(A-\bar{A})^2$	$P(B-\bar{B})^2$
0.10	10	0.20	8	1.936	6.05
0.50	12	0.30	13	2.88	0.075
0.30	18	0.40	15	3.88	0.9
0.10	20	0.10	20	3.13	4.225
	$\bar{A} = 14.4$		$\bar{B} = 13.5$	$\sigma_A^2 = 11.83$	$\sigma_B^2 = 11.925$
				$\sigma_A = 3.43$	~~$\sigma_B = 3.35$~~
					$\sigma_B = 3.35$

$$E(R_p) = 0.6 \times 14.4 + 0.4 \times 13.5$$
$$= 8.64 + 5.4$$
$$= 14.04\ \%$$

$$\sigma_p = \sqrt{(0.6)^2(11.83) + (0.4)^2(11.925) + 2(0.6)(0.4)(3.43)(3.35)(0.05}$$

$$= \sqrt{4.26 + 1.8 + 0.275}$$

$$\sigma_p = 2.52.$$

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Ques 48 04-NOV

Ans :

S_1	S_2	$(S_1-\bar{S}_1)$	$(S_2-\bar{S}_2)$	$(S_1-\bar{S}_1)(S_2-\bar{S}_2)$	$(S_1-\bar{S}_1)^2$	$(S_2-\bar{S}_2)^2$
12	20	-2.8	-1	2.8	7.84	1
8	22	-6.8	1	-6.8	46.24	1
7	24	-7.8	3	-23.4	60.84	9
14	18	-0.8	-3	2.4	0.64	9
16	15	1.2	-6	-7.2	1.44	36
15	20	0.2	-1	-0.2	0.04	1
18	24	3.2	3	9.6	10.24	9
20	25	5.2	4	20.8	27.04	16
16	22	1.2	1	1.2	1.44	1
22	20	7.2	-1	-7.2	51.84	1
$\bar{S}_1 = 14.8$	$\bar{S}_2 = 21$			-0.8	$\cancel{\sigma_{S_1}^2} = 207.6$	$\cancel{\sigma_{S_2}^2} = 84$

$\sigma_{S_1}^2 = 20.76$, $\sigma_{S_1} = 4.56$

$\sigma_{S_2}^2 = 8.4$ $\sigma_{S_2} = 2.9$

$$\text{correlation} = \frac{-0.8}{4.56 \times 2.9} = -0.06$$

Ques 49 05-NOV

Ans If a portfolio composed of equal investments then,

$$E(R) = \frac{1}{3} \times 0.08 + \frac{1}{3} \times 0.15 + \frac{1}{3} \times 0.12$$

$$= \frac{1}{3}(0.08 + 0.15 + 0.12) = 11.67\%$$

$$\sigma = \sqrt{(\tfrac{1}{3})^2(0.02)^2 + (\tfrac{1}{3})^2(0.16)^2 + (\tfrac{1}{3})^2(0.08)^2 + 2(\tfrac{1}{3})(\tfrac{1}{3})(0.02)(0.16)(0.40) + 2(\tfrac{1}{3})(\tfrac{1}{3})(0.02)(0.08)(0.6) + 2(\tfrac{1}{3})(\tfrac{1}{3})(0.16)(0.08)(0.8)}$$

$$\sigma = \sqrt{\tfrac{1}{9}[4 + 256 + 64] + [2560 + 1920 + 20480]\tfrac{1}{9}}$$

$$\sigma = 7.9\%$$

Ques 50. 05-NOV

Ans

P	A	B	M	$(A-\bar{A})$	$(B-\bar{B})$	$(M-\bar{M})$	$P(M-\bar{M})^2$
0.4	25	20	18	13.5	9.9	7.8	24.336
0.3	10	15	13	-1.5	4.9	2.8	2.352
0.3	-5	-8	-3	-16.5	-18.1	-13.2	52.272
$\bar{A} = 11.5$		$\bar{B} = 10.1$	$\bar{M} = 10.2$			σ_m^2	78.96

$P(A-\bar{A})(M-\bar{M})$	$P(B-\bar{B})(M-\bar{M})$
42.12	30.888
-1.26	4.116
65.34	71.67
106.2	106.68

$$\beta_A = \frac{106.2}{78.96} = 1.344, \quad \beta_B = \frac{106.68}{7896} = 1.351$$

$E(R_A) = 11 + 1.344(10.2 - 11) = 9.924$

$E(R_B) = 11 + 1.351(10.2 - 11) = 9.91$

∴ Both are under priced. The investor should make fresh investments in them.

Que 51 07 - NOV

Ans

P	β	E(R)	Jensen's Alpha	Rank
A	1.69	17.24	2.76	2
B	1	14.3	2.70	3
C	0.8	13.46	4.54	1
D	1.3	15.56	0.44	4
E	0.86.	13.72	-0.22	5

$$\beta = \frac{\rho \sigma_p}{\sigma_m}$$

$$\beta_A = \cancel{1.69} \; \frac{0.8869 \times 2.3}{1.2}$$

$$\beta_B = \frac{0.6667 \times 1.8}{1.2}$$

Jensen's Alpha
= AR − E(R)

$$\beta_C = \frac{0.6 \times 1.6}{1.2}$$

$$\beta_D = \frac{0.867 \times 1.8}{1.2}$$

$$\beta_E = \frac{0.5437 \times 1.9}{1.2}$$

$$E(R_A) = 10.1 + 1.69(14.3 - 10.1) = 17.24.$$
$$E(R_B) = 10.1 + 1(14.3 - 10.1) = 14.3.$$
$$E(R_C) = 10.1 + 0.8(14.3 - 10.1) = 13.46.$$
$$E(R_D) = 10.1 + 1.3(14.3 - 10.1) = 15.56$$
$$E(R_E) = 10.1 + 0.86(14.3 - 10.1) = 13.72$$

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Ques 52 07 - NOV - (b)

Ans

$E(R) = 9$ if $\beta = 1$ - (1)

$E(R) = 2$ if $\beta = 0$ - (2)

(1) $\rightarrow$ $R_f + 1(R_m - R_f) = 9$

(2) $\rightarrow$ $R_f + 0(R_m - R_f) = 2$

$\Rightarrow R_f = 2$

Substitute in eq (1).

$2 + 1(R_m - 2) = 9$

$2 - 2 + R_m = 9$

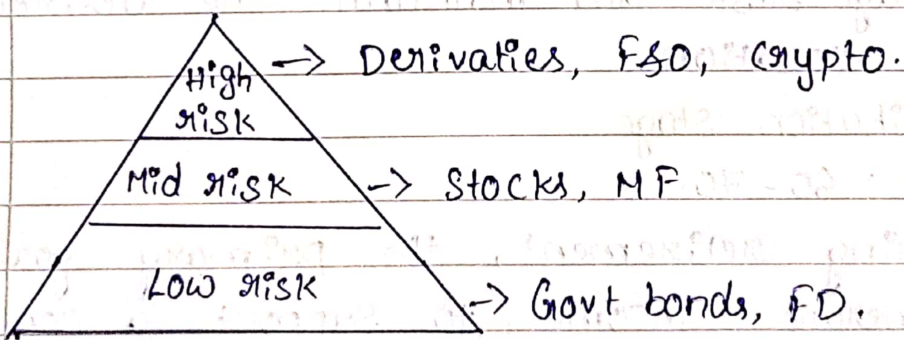
$R_m = 9.$

if $\beta = 0.75$

$E(R) = 2 + 0.75(9 - 2)$

$E(R) = 7.25.$

* Asset Allocation pyramid :



The asset allocation pyramid is a visual representation of a strategic investment approach that prioritizes risk management and diversification. It catagorizes investments into tiers based on their risk levels.

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× Investor life cycle :

- Accumulation Stage
  - Age : 20-40.

This is a period of building wealth for future goals. Young investors often have a higher risk tolerance and can invest in growth-oriented assets like stocks & equity mutual funds. Long-term investing is key, focusing on consistent contributions & weathering market fluctuations.

- Consolidation Stage
  - Age : 40-60.

As individuals approach retirement, their focus shifts to preserving wealth & generating income. A more balanced approach is adopted, combining growth and income-generating assets. Diversification and rebalancing become crucial to manage risk and maintain the desired asset allocation.

- Distribution Stage
  - Age : 60-70.

During retirement, the primary goal is to generate income to support a comfortable lifestyle. The focus shifts to more conservative investments like bonds and fixed-income funds. Risk management becomes paramount as protecting wealth from inflation and market volatility is essential.

- Legacy Stage
  - Age : 70 +

In the Later years of life, the emphasis is on transferring wealth to heirs or chairtable organizations. Tax - efficient strategies and estate planning are Key considerations. Charitable giving and minimizing estate taxes can maximize the impact of the wealth transfer.

1. EIC framework

Ans: EIC (Economy, industry & Company) analysis framework is a fundamental approach used in the investment decision making process, providing a structured way to examine the macroeconomic environment, the specific industry & individual companies.

Economic Analysis:

Economic Analysis involves examining various indicators, including GDP growth rates, inflation rates, interest rates, unemployment rates, fiscal and monetary policies and other economic indicators.
For instance: a lower interest rate might be beneficial for real estate and construction sectors dues to cheaper financing.

Industry Analysis :

Porter's Five Forces is a popular tool used in industry analysis, examining the competitive rivalry within the industry, the potential for new entrants, the power of suppliers, the power of customers and the threat of substitute products or services. By understanding these forces, investors can gauge the industry's profitability and long-term viability.

Company Analysis :

This level involves examining the company's financial health, management quality, competitive positioning, market share and growth prospects. Financial statement analysis, including ratios analysis is a critical component providing insights into the company's financial stability.