PORTFOLIO MANAGEMENT
CLASS 10
HOME WORK SUPPORT
COVERAGE

Question			Answer			Lecture Time
Q. No	Page no.	Book	Q. No	Page no.	Book	
19	36	HW Q BOOK	19	100	HW ANS BOOK	00:00:30 TO 00:17:54
21	37	HW Q BOOK	21	102	HW ANS BOOK	00:17:55 TO 00:42:02
20	37	HW Q BOOK	20	101	HW ANS BOOK	00:42:03 TO 00:44:56

PART II: CAPITAL MARKET THEORY (CMT)

Topic 15 TR, SR AND UR OF A PORTFOLIO

Question 19: SSEI HW Book Page No. 36

Following are the details of a portfolio consisting of three shares:

Share	Portfolio weight	Beta	Expected return in %	Total variance
A	0.20	0.40	14	0.015
B	0.50	0.50	15	0.025
C	0.30	1.10	21	0.100

Standard Deviation of Market Portfolio Returns = 10%

You are given the following additional data:

Covariance (A, B) = 0.030
Covariance (A, C) = 0.020
Covariance (B, C) = 0.040

Calculate the following:

i. The Portfolio Beta
ii. Residual variance of each of the three shares
iii. Portfolio variance using Sharpe Index Model
iv. Portfolio variance (on the basis of modern portfolio theory given by Markowitz)

(*Source: ICAI)*

ANSWER:

i. Portfolio Beta

0.20 x 0.40 + 0.50 x 0.50 + 0.30 x 1.10 = 0.66

ii. Residual Variance

To determine Residual Variance first of all we shall compute the Systematic Risk as follows:

$$\beta_A^2 \times \sigma_M^2 = (0.40)^2(0.01) = 0.0016$$

$$\beta_B^2 \times \sigma_M^2 = (0.50)^2(0.01) = 0.0025$$

$$\beta_C^2 \times \sigma_M^2 = (1.10)^2(0.01) = 0.0121$$

Residual Variance

A 0.015 – 0.0016 = 0.0134

B 0.025 – 0.0025 = 0.0225

C   0.100 – 0.0121 = 0.0879

iii. Portfolio variance using Sharpe Index Model

Systematic Variance of Portfolio = $(0.10)^2$ x $(0.66)^2$ = 0.004356

Unsystematic Variance of Portfolio

= 0.0134 x $(0.20)^2$ + 0.0225 x $(0.50)^2$ + 0.0879 x $(0.30)^2$ = 0.014072

Total Variance = 0.004356 + 0.014072 = 0.018428

iv. Portfolio variance on the basis of Markowitz Theory

$$=\left(w_A \times w_A \times \sigma_A^2\right)+\left(w_A \times w_B \times Cov_{AB}\right)+\left(w_A \times w_C \times Cov_{AC}\right)+\left(w_B \times w_A \times Cov_{AB}\right)+\left(w_B \times w_B \times \sigma_B^2\right)$$
$$\left(w_B \times w_C \times Cov_{BC}\right)+\left(w_C \times w_A \times Cov_{CA}\right)+\left(w_C \times w_B \times Cov_{CB}\right)+\left(w_C \times w_C \times \sigma_C^2\right)$$

= (0.20 x 0.20 x 0.015) + (0.20 x 0.50 x 0.030) + (0.20 x 0.30 x 0.020) + (0.20 x 0.50 x 0.030) + (0.50 x 0.50 x 0.025) + (0.50 x 0.30 x 0.040) + (0.30 x 0.20 x 0.020) + (0.30 x 0.50 x 0.040) + (0.30 x 0.30 x 0.10)

= 0.0006 + 0.0030 + 0.0012 + 0.0030 + 0.00625 + 0.0060 + 0.0012 + 0.0060 + 0.0090

= 0.0363

PART II: CAPITAL MARKET THEORY (CMT)

Topic 15 TR, SR AND UR OF A PORTFOLIO

Question 21: **SSEI HW Book Page No. 37**

Following information is available regarding expected return, standard deviation and beta of 6 share are available in the stock market.

Security	Expected Return	Beta	S.D (%)
1	5	0.70	9
2	10	1.05	14
3	11	0.95	12
4	12.5	1.10	20
5	15	1.40	17.5
6	16	1.70	25

Suppose risk rate of return is 4% and Market return is 6% and standard deviation is 10%. You are required to compute.

i. Which security is undervalued and which is overvalued.

ii. Assuming that funds are equally invested these six stocks, then compute.
   a. Return of portfolio
   b. Risk Portfolio

iii. Suppose if above portfolio is invested in with margin of 40% and cost of borrowing is 4% then 100% level of significance.

(*Source: ICAI)*

ANSWER:

i.

Security	E (R)	R_e	β	α	Pricing Status
1	5	8.2	0.70	-3.2	Overvalued
2	10	10.3	1.05	-0.3	Overvalued
3	11	9.7	0.95	1.3	Undervalued
4	12.5	10.6	1.10	1.9	Undervalued
5	15	12.4	1.40	2.6	Undervalued
6	16	14.2	1.70	1.8	Undervalued
	69.5				

ii.

Security	E (R)	β	$UR = \sigma_y^2 - \beta^2\sigma_m^2$	
1	5	0.7	81 - 49 =	32
2	10	1.05	196 - 110.25 =	85.75
3	11	0.95	144 - 90.25 =	53.75
4	12.5	1.10	400 - 121 =	279
5	15	1.40	306.25 - 196 =	110.25
6	16	1.70	625 - 289 =	336
	69.5	**6.9**		**896.75**

$$E(R_p) = \frac{69.5}{6} = 11.58\%$$

$$\beta_p = \frac{6.9}{6} = 1.15$$

$$SR_p = (115)^2 \times 10^2 = 132.25$$

$$UR_p = \frac{896.75}{36 \text{ alway square}} = 24.91\%^2$$

Risk of portfolio = SR + USR

= 132.25 + 24.91

= 157.16 $(\%)^2$

= 12.54%

iii. For convenience, let us represent the portfolio as X

W_x	$\frac{100}{40}$	2.5	11.58%	12.54%
W_{Rf}	$\frac{-60}{40}$	-1.5	4%	0
		1		

Hence E(R) of the leveraged portfolio = 2.5 × 11.58 - 1.5 × 4

= 28.95 - 6

= 22.95%

σ of the leveraged portfolio = 2.5 × 12.54

= 31.35%

PART II: CAPITAL MARKET THEORY (CMT)

Topic 15 TR, SR AND UR OF A PORTFOLIO

Question 20: **SSEI HW Book Page No. 37**

Following are the details of a portfolio consisting of 3 shares:

Shares	Portfolio Weight	Beta	Expected Return (%)	Total Variance
X Ltd.	0.3	0.50	15	0.020
Y Ltd.	0.5	0.60	16	0.010
Z Ltd.	0.2	1.20	20	0.120

Standard Deviation of Market Portfolio Return = 12%

You are required to calculate the following:

i. The Portfolio Beta.

ii. Residual Variance of each of the three shares.

iii. Portfolio Variance using Sharpe Index Model.

(Source: ICAI)

ANSWER:

i. Portfolio Beta

0.30 x 0.50 + 0.50 x 0.60 + 0.20 x 1.20 = 0.15 + 0.3 + 0.24 = 0.69

ii. Residual Variance

To determine Residual Variance first of all we shall compute the Systematic Risk as follows:

$$\beta_X^2 \times \sigma_M^2 = (0.5)^2(0.12)^2 = 0.0036$$

$$\beta_Y^2 \times \sigma_M^2 = (0.6)^2(0.12)^2 = 0.0052$$

$$\beta_Z^2 \times \sigma_M^2 = (1.20)^2(0.12)^2 = 0.0207$$

Residual Variance = Total Variance – Systematic Risk

X 0.020 – 0.0036 = 0.0164

Y 0.010 – 0.0052 = 0.0048

Z 0.120 – 0.0207 = 0.0993

iii. Portfolio variance using Sharpe Index Model

Portfolio Variance = Systematic Risk of the Portfolio + Unsystematic Risk of the Portfolio

Systematic Variance of Portfolio = $(0.12)^2$ x $(0.69)^2$ = 0.006856

Unsystematic Variance of Portfolio = 0.0164 x $(0.30)^2$ + 0.0048 x $(0.50)^2$+0.0993 x $(0.20)^2$ = 0.006648

Total Variance = 0.006856+ 0.006648 = 0.013504