

PORTFOLIO CLASS 14

HOME WORK SUPPORT

COVERAGE

Question			Answer			Lecture Time
Q. No	Page no.	Book	Q. No	Page no.	Book	
23	38	HW Q BOOK	23	104	HW ANS BOOK	00:00:31 - 00:37:05
EXTRA Q	136	HW ANS BOOK	EXTRA Q	137	HW ANS BOOK	00:37:06 - 00:38:25

PART IV: SHARPE OPTIMISATION APPROACH

Topic 18 SHARPE OPTIMISATION

Question 23: SSEI HW Book Page No. 38

Ramesh wants to invest in stock market. He has got the following information about individual securities:

Security	Expected Return	Beta	σ^2_{ci}
A	15	1.5	40
B	12	2	20
C	10	2.5	30
D	09	1	10
E	08	1.2	20
F	14	1.5	30

Market index variance is 10 percent and the risk free rate of return is 7%. What should be the optimum portfolio assuming no short sales?

(Source: ICAI)

ANSWER:

Securities need to be ranked on the basis of excess return to beta ratio from highest to the lowest.

Security	R_i	β_i	$R_i - R_f$	$\frac{R_i - R_f}{\beta_i}$
A	15	1.5	8	5.33
B	12	2	5	2.5
C	10	2.5	3	1.2
D	9	1	2	2
E	8	1.2	1	0.83
F	14	1.5	7	4.67

Ranked Table:

Security	$R_i - R_f$	β_i	σ^2_{ei}	$\frac{(R_i - R_f) \times \beta_i}{\sigma^2_{ei}}$	$\sum_{e=i}^N \frac{(R_i - R_f) \times \beta_i}{\sigma^2_{ei}}$	$\frac{\beta_i^2}{\sigma^2_{ei}}$	$\sum_{e=i}^N \frac{\beta_i^2}{\sigma^2_{ei}}$	C_i
A	8	1.5	40	0.30	0.30	0.056	0.056	1.923
F	7	1.5	30	0.35	0.65	0.075	0.131	2.814
B	5	2	20	0.50	1.15	0.20	0.331	2.668
D	2	1	10	0.20	1.35	0.10	0.431	2.542
C	3	2.5	30	0.25	1.60	0.208	0.639	2.165
E	1	1.2	20	0.06	1.66	0.072	0.711	2.047

$$CA = 10 \times 0.30 / [1 + (10 \times 0.056)] = 1.923$$

$$CF = 10 \times 0.65 / [1 + (10 \times 0.131)] = 2.814$$

$$CB = 10 \times 1.15 / [1 + (10 \times 0.331)] = 2.668$$

$$CD = 10 \times 1.35 / [1 + (10 \times 0.431)] = 2.542$$

$$CC = 10 \times 1.60 / [1 + (10 \times 0.639)] = 2.165$$

$$CE = 10 \times 1.66 / [1 + (10 \times 0.7111)] = 2.047$$

Cut off point is 2.814

$$Z_i = \frac{\beta_i}{\sigma^2_{ei}} \left[\left(\left[\frac{(R_i - R_f)}{\beta_i} - C \right] \right) \right]$$

$$Z_A = \frac{1.5}{40} (5.33 - 2.814) = 0.09435$$

$$Z_F = \frac{1.5}{30} (4.67 - 2.814) = 0.0928$$

$$X_A = 0.09435 / [0.09435 + 0.0928] = 50.41\%$$

$$X_F = 0.0928 / [0.09435 + 0.0928] = 49.59\%$$

Funds to be invested in security A & F are 50.41% and 49.59% respectively.

PART VI: PORTFOLIO REBALANCING

EXTRA QUESTIONS

Topic 18 CORNER THEOREM

Question: HOME WORK ANS BOOK PAGE 136

An investor has two portfolios known to be on minimum variance set for a population of three securities A, B and C having below mentioned weights:

	WA	WB	WC
Portfolio X	0.50	0.20	0.30
Portfolio Y	0.30	0.30	0.40

It is supposed that there are no restrictions on short sales.

- What would be the weight for each stock for a portfolio constructed by investing ₹20,000 in portfolio X and ₹30,000 in portfolio Y?
- Suppose the investor invests ₹20,000 out of ₹50,000 in security C. How he will allocate the balance between security A and B to ensure that his portfolio is on minimum variance set?

(Source: FOD)

ANSWER: HOME WORK ANS BOOK PAGE 137

- Investment committed to each security would be:

	A (₹)	B (₹)	C (₹)	Total (₹)
Portfolio X	10,000	4,000	6,000	20,000
Portfolio Y	9,000	9,000	12,000	30,000
Combined Portfolio	19,000	13,000	18,000	50,000
∴ Stock weights	0.38	0.26	0.36	

- The equation of critical line takes the following form:

$$WB = a + bWC$$

Substituting the values of WA & WB from portfolio X and Y in above equation, we get

$$0.20 = a + 0.30b, \text{ and}$$

$$0.30 = a + 0.40b$$

Solving above equation we obtain the slope and intercept, $a = -0.10$ and $b = 1$ and thus, the critical line is

$$WB = WC - 0.10$$

If 40% of the funds is invested in security C then,

$$WB = 0.40 - 0.10 = 0.30$$

Since $WA + WB + WC = 1$

$$WA = 1 - 0.40 - 0.30 = 0.30$$

∴ Allocation of funds to

$$\text{security A} = 0.30 \times 50,000 = ₹ 15,000$$

&

$$\text{Security B} = 0.30 \times 50,000 = ₹ 15,000$$