PORTFOLIO MANAGEMENT CLASS 8

CLASS WORK COVERAGE

To streamline our learning process, I've categorized the questions we'll tackle in class into four distinct groups:

1. ***Classic:*** *These questions are exactly as presented in your book, providing a familiar foundation.*
2. ***Transformed:*** *Here, we've converted book questions into multiple-choice format to enhance your analytical skills.*
3. ***Adapted:*** *These are similar to book questions but with altered numbers or names, presented as multiple-choice questions for varied practice.*
4. ***Original:*** *These are entirely new questions not found in your book, designed to challenge and expand your understanding.*

This structure will help us navigate through a range of problems, ensuring a comprehensive grasp of the material. Looking forward to our next session!

Q. No.	Type	Book	Page No.	Q No.
1	Original	-	-	-
2	Original	-	-	-
3	Original	-	-	-
4	Original	-	-	-

Question 1:

Following is the information related to return on shares of three different companies:

Years	A Ltd.	B Ltd.	C Ltd.
2018	2%	3%	5%
2019	6%	8%	7%
2020	13%	14%	15%
2021	7%	9%	11%

Required:

i. Construct maximum number of portfolio and its return, if each portfolio consists of any two Company's shares in proportion of 65% and 35% and suggest which portfolio provides highest return.

ii. Calculate portfolio return and beta (β), if Mr. X invests ₹ 65,000 in A Ltd. having beta (β) of 0.45; ₹ 20,000 in B Ltd. having beta (β) of 1.15 and ₹ 15,000 in C Ltd. having beta (β) of 1.8.

Answer:

Calculation of Average Return

Year	A Ltd.	B Ltd.	C Ltd.
2018	2%	3%	5%
2019	6%	8%	7%
2020	13%	14%	15%
2021	7%	9%	11%
Sum	28%	34%	38%
Average	7%	8.50%	9.50%

i.

1. Combination 1 - 65% in A Ltd. & 35% B Ltd.
   Return = 7% × 0.65 + 8.50% × 0.35 = 4.55% + 2.975% = 7.525% or 7.53%
2. Combination 2 – 65% in B Ltd. & 35% in C Ltd.
   Return = 8.50% × 0.65 + 9.50% × 0.35 = 5.525% + 3.325% = 8.85%
3. Combination 3 – 65% in C Ltd. & 35% in A Ltd.
   Return = 0.65 × 9.50% + 0.35 × 7.00% = 6.175% + 2.45% = 8.625% or 8.63%
4. Combination 4 – 65% in A Ltd. & 35% in C Ltd.
   Return = 0.65 × 7% + 0.35 × 9.50% = 4.55% + 3.325% = 7.875% or 7.88%
5. Combination 5 – 35% in A Ltd. & 65% in B Ltd.
   Return = 0.35 × 7% + 0.65 × 8.50% = 2.45% + 5.525% = 7.975% or 7.98%
6. Combination 6 – 35% in B Ltd. & 65% in C Ltd.
   Return = 0.35 × 8.50% + 0.65 × 9.50% = 2.975% + 6.175% = 9.15%

Since maximum return is under Combination - 6 i.e. 65% investment in C Ltd. and 35% in B Ltd. hence it should be opted for.

ii. Calculation of Return and Beta of Portfolio

$$\text{Return of Portfolio} = 7\% \times \frac{65,000}{1,00,000} + 8.50\% \times \frac{20,000}{1,00,000} + 9.50\% \times \frac{15,000}{1,00,000}$$

= 7.675%

$$\text{Beta of Portfolio} = 0.45 \times \frac{65,000}{1,00,000} + 1.15 \times \frac{20,000}{1,00,000} + 1.80 \times \frac{15,000}{1,00,000} =$$

0.7925 or 0.79

Question 2:

Expected returns on two stocks against BSE SENSEX returns are given in the following table under two scenarios-bullish and bearish:

Market return	Scenario -1: Bullish Case	Scenario -2: Bearish Case
BSE Sensex	25%	-5%
Stock R	32%	-4%
Stock Z	18%	-3%

You are required to calculate:

i. The Betas of two stocks R and Z.

ii. Expected return on each stock, if the likelihood of market achieving Scenario-1 is thrice the likelihood of the market achieving Scenario-2.

iii. The Security Market Line (SML), if the risk free rate is 8% and likelihood of the market return achieving the bullish base returns of 25% is thrice that of achieving -5% returns.

iv. The Alphas of the two stocks based on Sharpe Index Model.

Answer:

i. The Betas of two stocks:

Stock R - (32% + 4%)/(25% + 5%) = 1.2
Stock Z - (18% + 3%)/(25% + 5%) = 0.70

Alternatively, it can also be solved by using the Characteristic Line Relationship as follows:

$R_s = \alpha + \beta R_m$
Where
α = Alpha
β = Beta
R_m= Market Return

For Stock R

32% = α + β(25%)
- 4% = α + β(-5%)
36% = β(30%)
β = 1.2

For Stock Z

18% = α + β(25%)
-3% = α + β(-5%)
21% = β(30%)
β = 0.70

Alternatively, Beta can also be calculated as follows:

Basic Calculation for stock R

(R_R)	$\overline{R_R}$	$R_R - \overline{R_R}$	$(R_R - \overline{R_R})^2$	(R_m)	$\overline{R_M}$	$R_m - \overline{R_M}$	$(R_m - \overline{R_M})^2$	$(R_R - \overline{R_R})(R_m - \overline{R_M})$
32%	14%	18%	324	25%	10%	15%	225	270
-4%	14%	-18%	324	-5%	10%	-15%	225	270
Total			648				450	540

Basic Calculation for stock Z

(R_Z)	$\overline{R_Z}$	$R_Z - \overline{R_Z}$	$(R_Z - \overline{R_Z})^2$	(R_m)	$\overline{R_M}$	$R_m - \overline{R_M}$	$(R_m - \overline{R_M})^2$	$(R_Z - \overline{R_Z})(R_m - \overline{R_M})$
18%	7.5%	10.5%	110.25	25%	10%	15%	225	157.50
-3%	7.5%	-10.5%	110.25	-5%	10%	-15%	225	157.50
Total			220.50				450	315

Co- Variance (R, M) = 540/2=270

Co- Variance (Z, M) = 315/2=157.50

$(\sigma_M)^2$ =450/2 = 225

Beta of stocks R & Z

$$\text{Beta (R)} = \frac{\text{Cov.(R,M)}}{\sigma_M^2} = 270/225 = 1.2$$

$$\text{Beta (Z)} = \frac{\text{Cov.(R,Z)}}{\sigma_M^2} = 157.5/225 = 0.7$$

ii. Expected returns of the two stocks:

Stock R - 0.75 x 32% - 0.25 x 4% = 23%

Stock Z - 0.75 x 18% - 0.25 x 3% = 12.75%

iii. Expected return of market portfolio = 0.75 x 25% + 0.25% x (-5%) = 17.50%

∴ Market risk prem. = 17.50% - 8.00% = 9.5%

∴ SML is, required return = 8.00% + βi 9.5%

iv. Alpha for two stocks

Required Return for Stock R

$E(R) = \alpha_R + \beta R_M$

Accordingly 23% = α_R + 1.20 x 17.50%

α_R = 2%

Required Return for Stock Z

$E(Z) = \alpha_Z + \beta R_M$

Accordingly

12.75% = α_Z + 0.70 x 17.50%

α_Z = 0.5%

Question 3:

M/s. Siri Ltd. Has a surplus amount of ₹ 3 crores to invest and has shortlisted the following equity shares:

Company	Beta
S Ltd.	1.6
K Ltd.	1
P Ltd.	-0.3
D Ltd.	2
C Ltd.	0.6

Required:

i. If M/s. Siri Ltd. invests an equal amount in all securities, what is the beta of the portfolio?

ii. If M/s. Siri Ltd. invests 15% of its investment in S Ltd., 15% in P Ltd., 10% in C Ltd. and the balance in equal amount in the other two securities, what is the beta of the portfolio?

iii. If the expected return of market portfolio is 12% at a beta facto r of 1.0, what will be the portfolios expected return in both the situations given above?

iv. If the Company changes its policy to invest in any 3 securities with a minimum of 20% in each of these 3 securities to diversify risk, you are requested to advise the company to have a right mix of securities to maximize the return in the following two scenarios and also calculate the expected return:

(1) Bull Phase: Expected Market returns 10%

(2) Bear Phase: Expected Market returns — 5%

Answer:

i. Beta of the Portfolio

Investment	Beta (β)	Investment (₹ Lakhs)	Weighted Investment
S Ltd.	1.6	60	96
K Ltd.	1.0	60	60
P Ltd.	-0.3	60	-18
D Ltd.	2.0	60	120
C Ltd.	0.6	60	36
		300	294

$$\beta_P = \frac{294 \text{ lakh}}{300 \text{ lakh}} = 0.98$$

Alternatively, it can also be computed as follows:

$$1.6 \times \frac{1}{5} + 1.0 \times \frac{1}{5} + (-0.30) \times \frac{1}{5} + 2 \times \frac{1}{5} + 0.6 \times \frac{1}{5} = 0.98$$

ii. With varied percentages of investments portfolio beta is calculated as follows:

Investment	Beta (β)	Investment (₹ Lakhs)	Weighted Investment
S Ltd.	1.6	45	72
K Ltd.	1.0	90	90
P Ltd.	-0.3	45	-13.50
D Ltd.	2.0	90	180
C Ltd.	0.6	30	18
		300	346.50

Beta = 346.50/300 = 1.155

iii. Expected return of the portfolio with pattern of investment as in case (i) = 12% × 0.98 i.e. 11.76%

Expected Return with pattern of investment as in case (ii) = 12% × 1.155 i.e., 13.86%.

iv.

1. Securities to be selected during Bull Phase Expected Market returns 10%
   As it is bull Market Higher Beta stocks should be selected.

Shares	% to be invested	Beta (β)	Investment	Weighted Investment
S Ltd.	20	1.6	60,00,000	96,00,000
K Ltd.	20	1	60,00,000	60,00,000
P Ltd.	0	-0.3	-	-
D Ltd.	60	2	1,80,00,000	3,60,00,000
C Ltd.	0	0.6	-	-
	100		3,00,00,000	5,16,00,000

Portfolio or Weighted Beta (β) (5,16,00,000/ 3,00,00,000)	1.72
Portfolio Beta (β)	1.72
Market Return	10%
Expected Return	17.20%

2. Securities to be selected During Bear Phase Expected Market returns – 5%
   As it is bear market Lower Beta stocks should be selected

Shares	% to be invested	Beta (β)	Investment	Weighted Investment
S Ltd.	0	1.6	-	-
K Ltd.	20	1	60,00,000	60,00,000
P Ltd.	60	-0.3	1,80,00,000	-54,00,000
D Ltd.	0	2	-	-
C Ltd.	20	0.6	60,00,000	36,00,000
	100		3,00,00,000	42,00,000

Portfolio or Weighted Beta (β) (42,00,000/ 3,00,00,000)	0.14
Portfolio Beta (β)	0.14
Market Return	-5%
Expected Return	-0.70%

Question 4:

On the basis of given information, Mr. XLY want to create a portfolio equally as risky as the market and is having ₹20,00,000 to invest.

Assets	Investment	Beta
Stock A	₹ 4,00,000	0.70
Stock B	₹ 5,00,000	1.10
Stock C	?	1.60
Debenture (D)	?	0

How do you recommend and interpret the risk scenario and investment in all the securities?

Answer:

Let W_A, W_B, W_C and W_D be the weights of Stock A, B, C and Debenture respectively.

W_A = 4,00,000 ÷ 20,00,000 = 0.20

W_B = 5,00,000 ÷ 20,00,000 = 0.25

Now = $W_C + W_D = 1 – W_A – W_B$ = 0.55

It is given in the question that Portfolio should be as risky as that of the market. It means Beta of the portfolio should be 1.

Hence,

W_A (0.7) + W_B (1.1) + W_C (1.6) + W_D (0) = 1

0.2 × 0.7 + 0.25 × 1.1 + 1.6W_C + W_D × 0 = 1

0.14 + 0.275 + 1.6W_C + 0 = 1

1.6 W_C = 1 – 0.415

1.6 W_C = 0.585

W_C = 0.585/1.6 = 0.3656

Weight of Debenture (W_D) = 1- 0.2 – 0.25 – 0.3656 = 0.1844

Hence, Amount invested in Stock C

= 0.3656 × 20,00,000 = ₹ 7,31,200

Amount invested in Debenture (D)

= 0.1844 × 20,00,000

= ₹ 3,68,800

Thus, amount to be invested in Stock (C) is ₹ 7,31,200 and in Debenture is ₹ 3,68,800.