

PORTFOLIO MANAGEMENT

CLASS 9

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 | <i>Classic</i> | CW Q BOOK | 57 | 37 |
| 2 | <i>Classic</i> | CW Q BOOK | 57 | 38 |

Question 1:

A Portfolio Manager (PM) has the following four stocks in his portfolio:

| Security | No. of Shares | Market Price per share (₹) | β |
|----------|---------------|----------------------------|---------|
| VSL | 10,000 | 50 | 0.9 |
| CSL | 5,000 | 20 | 1.0 |
| SML | 8,000 | 25 | 1.5 |
| APL | 2,000 | 200 | 1.2 |

Compute the following:

- Portfolio beta.
- If the PM seeks to reduce the beta to 0.8, how much risk free investment should he bring in?
- If the PM seeks to increase the beta to 1.2, how much risk free investment should he bring in?

Answer:

| Security | No. of shares (1) | Market Price of Per Share (2) | (1) × (2) | % to total (w) | β (x) | wx |
|----------|----------------------|----------------------------------|----------------|-------------------|-------|--------------|
| VSL | 10000 | 50 | 500000 | 0.4167 | 0.9 | 0.375 |
| CSL | 5000 | 20 | 100000 | 0.0833 | 1 | 0.083 |
| SML | 8000 | 25 | 200000 | 0.1667 | 1.5 | 0.250 |
| APL | 2000 | 200 | 400000 | 0.3333 | 1.2 | 0.400 |
| | | | <u>1200000</u> | 1 | | <u>1.108</u> |

Portfolio beta 1.108

i. Required Beta 0.8

It should become (0.8 / 1.108) 72.2 % of present portfolio

If ₹ 12,00,000 is 72.20%, the total portfolio should be

₹ 12,00,000 × 100/72.20 or ₹ 16,62,050

Additional investment in zero risk should be (₹ 16,62,050 – ₹ 12,00,000) = ₹ 4,62,050

Revised Portfolio will be

| Security | No. of shares(1) | Market Price of Per Share (2) | (1) × (2) | % to total (w) | β (x) | wx |
|--------------------|---------------------|-------------------------------------|-----------|-------------------|-------|-------|
| VSL | 10000 | 50 | 500000 | 0.3008 | 0.9 | 0.271 |
| CSL | 5000 | 20 | 100000 | 0.0602 | 1 | 0.060 |
| SML | 8000 | 25 | 200000 | 0.1203 | 1.5 | 0.180 |
| APL | 2000 | 200 | 400000 | 0.2407 | 1.2 | 0.289 |
| Risk free asset | 46205 | 10 | 462050 | 0.2780 | 0 | 0 |
| | | | 1662050 | 1 | | 0.800 |

ii. To increase Beta to 1.2

Required beta 1.2

It should become 1.2 / 1.108

108.30% of present beta If 1200000 is 108.30%, the total portfolio should be

₹ 1200000 × 100/108.30 or ₹ 1108033 say ₹ 1108030

Additional investment should be (-) ₹ 91,967 i.e. Divest ₹ 91970 of Risk Free Asset

Revised Portfolio will be

| Security | No. of shares (1) | Market Price of Per Share (2) | (1) × (2) | % to total (w) | β (x) | wx |
|-----------------|-------------------|-------------------------------|-----------|----------------|-------|-------|
| VSL | 10000 | 50 | 500000 | 0.4513 | 0.9 | 0.406 |
| CSL | 5000 | 20 | 100000 | 0.0903 | 1 | 0.090 |
| SML | 8000 | 25 | 200000 | 0.1805 | 1.5 | 0.271 |
| APL | 2000 | 200 | 400000 | 0.3610 | 1.2 | 0.433 |
| Risk free asset | -9197 | 10 | -91970 | -0.0830 | 0 | 0 |
| | | | 1108030 | 1 | | 1.20 |

Portfolio beta

1.20

Question 2:

The returns and market portfolio for a period of four years are as under:

| Year | % Return of Stock B | % Return on Market Portfolio |
|------|---------------------|------------------------------|
| 1 | 10 | 8 |
| 2 | 12 | 10 |
| 3 | 9 | 9 |
| 4 | 3 | -1 |

For stock B, you are required to determine:

- i. characteristic line
- ii. the Systematic and Unsystematic risk.

Answer:

Characteristic line is given by

$$\alpha_i + \beta_i R_m$$

$$\beta_i = \frac{\sum xy - n \bar{x} \bar{y}}{\sum x^2 - n(\bar{x})^2}$$

$$\alpha_i = \bar{y} - \beta \bar{x}$$

| Return on B (Y) | Return on Market (X) | XY | X ² | (x- \bar{x}) | (x- \bar{x}) ² | (y- \bar{y}) | (y- \bar{y}) ² |
|-----------------|----------------------|-----------|----------------|-----------------|------------------------------|-----------------|------------------------------|
| 10 | 8 | 80 | 64 | 1.50 | 2.25 | 1.50 | 2.25 |
| 12 | 10 | 120 | 100 | 3.50 | 12.25 | 3.50 | 12.25 |
| 9 | 9 | 81 | 81 | 2.50 | 6.25 | 0.50 | 0.25 |
| <u>3</u> | <u>-1</u> | <u>-3</u> | <u>1</u> | -7.50 | <u>56.25</u> | -5.50 | <u>30.25</u> |
| 34 | 26 | 278 | 246 | | 77.00 | | 45.00 |

$$\bar{y} = \frac{34}{4} = 8.50$$

$$\bar{x} = \frac{26}{4} = 6.50$$

$$\beta = \frac{\sum xy - n \bar{x} \bar{y}}{\sum x^2 - n(\bar{x})^2} = \frac{278 - 4(6.50)(8.50)}{246 - 4(6.50)^2} = \frac{278 - 221}{246 - 169} = \frac{57}{77} = 0.74$$

$$\alpha = \bar{y} - \beta \bar{x} = 8.50 - 0.74(6.50) = 3.69$$

Hence the characteristic line is $3.69 + 0.74 (R_m)$

$$\text{Total Risk of Market} = \sigma_{m^2} = \frac{\sum(x-\bar{x})^2}{n} = \frac{77}{4} = 19.25(\%)$$

$$\text{Total Risk of Stock} = \frac{45}{4} = 11.25 (\%)$$

$$\text{Systematic Risk} = \beta_i^2 \sigma_m^2 = (0.74)^2 \times 19.25 = 10.54(\%)$$

$$\begin{aligned} \text{Unsystematic Risk is} &= \text{Total Risk} - \text{Systematic Risk} \\ &= 11.25 - 10.54 = 0.71(\%) \end{aligned}$$