Example: 1

Security J has a beta of 0.75 while security K has a beta of 1.45. Calculate the expected return for these securities, assuming that the risk free rate is 5 per cent and the expected return of the market is 14 per cent.

Solution

The expected return can be calculated using CAPM

$$\overline{R_i} = R_f + \beta_i [\overline{R_m} - R_f)$$

For security J

$$\overline{R_i} = 5 + 0.75 (14 – 5)$$

$$= 5 + 6.75 = 11.75 \text{ per cent}$$

For security K

$$R_i = 5 + 1.45 (14 – 5)$$

$$= 5 + 13.05 = 18.05 \text{ per cent}$$

Example: 2

A security pays a dividend of Rs. 3.85 and sells currently at Rs. 83. The security is expected to sell at Rs. 90 at the end of the year. The security has a beta of 1.15. The risk free rate is 5 per cent and the expected return on market index is 12 per cent. Assess whether the security is correctly priced.

Solution

To assess whether a security is correctly priced, we need to calculate (a) the expected return as per CAPM formula, (b) the estimated return on the security based on the dividend and increase in price over the holding period.

Expected return

$$R_i = R_f + \beta_i [R_m - R_f]$$

$$= 5 + 1.15 (12 - 5)$$

$$= 5 + 8.05 = 13.05 \text{ per cent}$$

Estimated return

$$R_i = \frac{(P_1 - P_0) + D_1}{P_0}$$

$$= \frac{(90 - 83) + 3.85}{83}$$

$$= \frac{7 + 3.85}{83}$$

$$= 10.85 / 83 = 0.1307 = 13.07 \text{ per cent.}$$

As the estimated return on the security is more or less equal to the expected return, the security can be assessed as fairly priced.

Example: 3

The following data are available to you as portfolio manager:

Security	Estimated return (per cent)	Beta	Standard deviation (per cent)
A	30	2.0	50
B	25	1.5	40
C	20	1.0	30
D	11.5	0.8	25
E	10.0	0.5	20
Market index	15	1.0	18
Govt. security	7	0	0

a) In terms of the security market line, which of the securities listed above are underpriced?

b) Assuming that a portfolio is constructed using equal proportions of the five securities listed above, calculate the expected return and risk of such a portfolio.

Solution

(a) We can use CAPM to determine which of the securities listed are underpriced. For this we have to calculate the expected return on each securing using CAPM equation:

$$\overline{R_i} = R_f + \beta_i \overline{[R_m - R_f)}$$

Given that R_f (Govt. security return rate) = 7 and R_m = 15

The equation becomes

$$\overline{R_i} = 7 + \beta_i [15 - 7)$$

Now,

Security A = 7 + 2.0 (15 – 7) = 7 + 16 = 23 per cent

Security B = 7 + 1.5 (15 – 7) = 7 + 12 = 19 per cent

Security C = 7 + 1.0 (15 – 7) = 7 + 8 = 15 per cent

Security D = 7 + 0.8 (15 – 7) = 7 + 6.4 = 13.4 per cent

Security E = 7 + 0.5 (15 – 7) = 7 +4 = 11 per cent

The expected return as per CAPM formula and the estimated return of each security can be tabulated.

Security	Estimated return (per cent)	Estimated return (per cent)
A	23.0	30.0
B	19.0	25.0
C	15.0	20.0
D	13.4	11.5
E	11.0	10.0

A security whose estimated return is greater than the expected return is assumed to be underpriced because it offers a higher return than expected from securities with the same risk.

According, securities A, B and C are underpriced.

(b) To calculate the expected return and risk $\overline{R_p}$ and β_p, we need to calculate β_p first

$$\beta_p = \sum_{i=1}^{n} w_i \beta_i$$

As the proportion of investment in each security is equal, $w_i = 0.20$

β_p = (0.2) (2.0) + (0.2) (1.5) + (0.2) (1.0) +(0.2) (0.8) +(0.2) (0.5)

= (0.2) (2.0 +1.5 +1.0+0.8+0.5)

= (0.2) (5.8) = 1.16

Expected return of portfolio

$$\overline{R_i} = R_f + \beta_i [\overline{R_m} - R_f)$$

$$= 7 + 1.16 (15 – 7)$$

$$= 7 + 9.28 = 16.28 \text{ per cent}$$

Systematic risk of the portfolio $\beta_i = 1.16$

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