

Chapter Tests of SFM of CA Ashish Lalaji 9825856155

Solution of Test of Portfolio Management – 2

Q 1

(a) Let factor sensitivity for market index be x.

Parameter	Actual Value in %	Expected Value in %	Risk Premium	Beta	Beta X Risk Premium
GNP	7.70	7.70	0	1.20	0.000
Inflation	7.00	5.50	1.50	1.75	2.625
Interest rate	9.00	7.75	1.25	1.30	1.625
Stock Market Index	12.00	10.00	2.00	X	2x
Industrial production	7.50	7.00	.50	1.00	0.500
					4.75 + 2x
Risk Free Return					9.25
Return as per APM					<u>14 + 2x</u>

Thus –

$$14 + 2x = 17.4$$

$$x = 17.4 - 14 / 2 = 1.7$$

As per CAPM –

$$E_r = 9.25 + 1.7 (12 - 9.25) = 13.925\%$$

(b)

(i) Identification of undervalued / overvalued securities is carried out under CAPM.

Equation of SML is –

$$E_r = 4 + 2 \beta_s$$

Determination of Alpha & the nature of security:

Security	Expected Return (%)	CAPM Return (%)	Alpha (%)	Nature of security
1	5	$4 + 2 (0.7) = 5.4$	- 0.4	Overvalued
2	10	$4 + 2 (1.05) = 6.1$	3.9	Undervalued
3	11	$4 + 2 (0.95) = 5.9$	5.1	Undervalued
4	12.5	$4 + 2 (1.10) = 6.2$	6.3	Undervalued
5	15	$4 + 2 (1.4) = 6.8$	8.2	Undervalued
6	16	$4 + 2 (1.70) = 7.4$	8.6	Undervalued

(ii)

(a) Determination of Portfolio Return:

$$\text{Portfolio Return} = 5 + 10 + 11 + 12.5 + 15 + 16 / 6 = 11.58\%$$

(b) Determination of Portfolio Risk:

Correlation coefficient between return of the securities is not given. Hence, market model is applied to determine portfolio risk.

Portfolio Beta = $0.7 + 1.05 + 0.95 + 1.1 + 1.4 + 1.7 / 6 = 1.15$

Residuary variance (Unsystematic Risk) is determined as under:

Security	σ_s	σ_s^2	β_s	β_s^2	σ_m^2	Systematic Risk	Unsystematic Risk
(a)	(b)	(c)	(d)	(e)	(f)	(g) = e . f	(h) = c - g
1	9	81	0.7	0.49	100	49	32
2	14	196	1.05	1.1025	100	110.25	85.75
3	12	144	0.95	0.9025	100	90.25	53.75
4	20	400	1.1	1.21	100	121	279
5	17.5	306.25	1.4	1.96	100	196	110.25
6	25	625	1.7	2.89	100	289	336

Portfolio

Variance = $(1.15)^2 (100) + [(1/6)^2 (32 + 85.75 + 53.75 + 279 + 110.25 + 336)]$
 = $132.25 + 24.91$
 = 157.16

Portfolio Risk = Square root of 157.16 = 12.54%

Q 2

(a) Calculation of Security Beta:

Stock A

$$\beta_A = \frac{\text{COV (A, M)}}{\sigma_m^2}$$

$$= \frac{106.2}{78.96}$$

$$= 1.345$$

Stock B

$$\beta_B = \frac{\text{COV (B, M)}}{\sigma_m^2}$$

$$= \frac{106.68}{78.96}$$

$$= 1.351$$

COV (A, M) = 106.2

COV (B, M) = 106.68

$\sigma_m^2 = 78.96$

Return of A = 11.5%

Return of B = 10.1%

Return of Market = 10.2%

Statistical Table of Calculations:

r_A	r_A	r_B	r_B	r_m	r_m	pi	$r_A - r_A$	$r_B - r_B$	$r_m - r_m$	h.j.g	i.j.g	$j^2.g$
a	b	c	d	e	f	g	h	i	j	k	l	m
25	11.5	20	10.1	18	10.2	.4	13.5	9.9	7.8	42.12	30.89	24.34
10	11.5	15	10.1	13	10.2	.3	-1.5	4.9	2.8	-1.26	4.12	2.35
-5	11.5	-8	10.1	-3	10.2	.3	-16.5	-18.1	-13.2	65.34	71.68	52.27
										106.20	106.68	78.96

Determining Alpha of Security and Recommendation:

$$\alpha_s = \frac{\text{Actual / Expected Return}}{\text{CAPM Return}}$$

As per CAPM -

$$E_r = R_f + \beta_s (R_m - R_f)$$

$$E_r = 11 + \beta_s (10.2 - 11)$$

$$E_r = 11 - 0.8 \beta_s$$

Investment decision is carried out as under:

Stock	Expected Return	CAPM Return	α_s	Type of Security	Decision
A	11.5%	11 - 0.8 (1.345) = 9.924%	1.576	Under-Priced	Buy
B	10.1 %	11 - 0.8 (1.351) = 9.9192%	0.18	Under-Priced	Buy

(b)

$$\text{Sharpe's Ratio} = \frac{r_{MF} - R_f}{\sigma_{MF}} \quad \left| \quad \text{Treynors's Ratio} = \frac{r_{MF} - R_f}{\beta_{MF}}$$

$$\text{Jensen's Alpha} = r_{MF} - \text{CAPM Return}$$

Where -

As per CAPM -

$$E_r = R_f + \beta_{MF} (R_m - R_f)$$

$$E_r = 9 + \beta_{MF} (14 - 9)$$

$$E_r = 9 + 5 \beta_{MF}$$

Mutual Fund	Sharpe		Treynor			CAPM Return	Jensen	
	Ratio	Rank	Beta	Ratio	Rank		Ratio	Rank
A	4	4	1.75	5.71	5	17.75%	1.25	5
B	3	5	0.90	6.67	4	13.5%	1.5	4
C	7.5	1	0.65	9.23	1	12.25%	2.75	2
D	4.25	2	1.25	6.80	3	15.25%	2.25	3
E	4.5	3	0.90	9.00	2	13.5%	3.6	1

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