PORTFOLIO MANAGEMENT

CLASS 6

- Now that we know how to calculate "β", what next?

V.V. Imp

Security Market Line (SML)

$$R_e = R_f + (R_m - R_f)\beta$$

Lets Analyse, :-

⇒ If $\beta_e = 0$ [Govt Sec]

⇒ $R_e = R_f$

⇒ If $\beta_e = 1$ [Market Portfolio]

$R_e = R_f + (R_m - R_f)1$

$\therefore R_e = R_m$

⇒ If $\beta_e = 2$

$R_e = R_f + (R_m - R_f)2$

⇒ If $\beta = 3$

$R_e = R_f + (R_m - R_f)3$

Sir, why are you writing this so many times?

R_e & R_m $R_e - R_f$ (Sec) → Stock kitna extra return dega R_f ke muqeable

⇓

Stock ka risk Premium

- $R_e - R_f = (R_m - R_f)\beta$

  $(R_m - R_f)$ ⇓ Market Risk Premium ∴ $\beta = 1$

  Stock ka Risk Premium

- R_f → Yield on Govt-Securities
  ⇓
  will be given
  ⇓
  If not given
  ⇓

Ex: 3 m TBill (FV 100) trades at 98.1. Calculate R_f ?

$$\therefore R_f = \frac{F-P}{P} \times 100 \times \frac{12}{n} \quad (n \rightarrow \text{no. of months})$$

$$= \frac{100-98.1}{98.1} \times 100 \times \frac{12}{3}$$

$$= 7.75\% \text{ approx}$$

- $R_m = E(R_m)$ = Expected Return on market Portfolio
  ⇓
  mean < Past data $= \frac{\sum R_m}{n}$ ($n \rightarrow$ no. of data points)
  Future Data $= \sum Px$

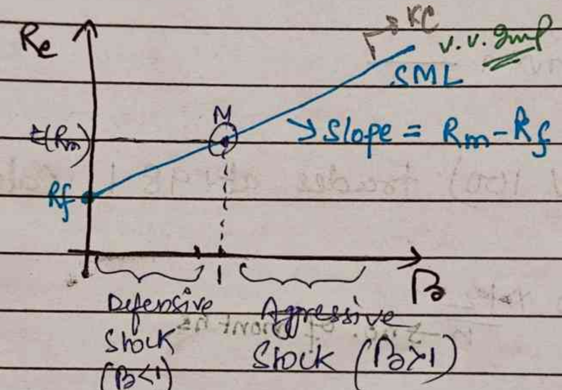
- $R_m - R_f$ = Market Risk Premium
  ⇓
  Ek "β" yaani 1 unit of "Systematic Risk" ko lene k badle kitna extra return chahiye.

This depends on the level of Risk aversion. If risk aversion rises due to crisis, market risk premium will rise.

Once again, Lets look at SML :-

$$R_e = R_f + (R_m - R_f)\beta$$

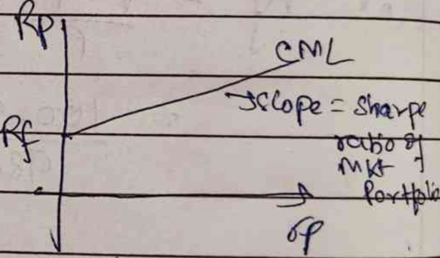
$$y = c + mx$$



→ Compare to CML

$$R_p = R_f + \left(\frac{R_m - R_f}{\sigma_m}\right)\sigma_p$$

aaj tak sunn nai aya ↑ Less imp



(R12) exp. stock ka return 24% 20% → Ke

legal

$E(R) > Re$ → buy → stock is underpriced

Same as Cap Budg ← stock underpriced ↓ SML → chaie → IRR

↓ aaj 1 yr baad

P ↑ 500 → 700 → E(R) = 40%

550 → 700 → E(R) = 27.27% ↓

600 → 700 → E(R) = 16.67% ↓

E(R) = Re → Equilibrium → stock is correctly priced

E(R) > Re } Disequilibrium

E(R) < Re

Expected Return v/s Required Return

i.e. E(R) v/s Re

E(R): ~~Cap Bud wala IRR~~ → Aaj stock ko agar Po pe buy karte hai toh what is the forecasted return?

Re: → Stock ka "systematic risk" yaani "β" ko dekhte hue what return do investors demand

$$R_e = R_f + (R_m - R_f)\beta$$

$E(R) > Re$ } Disequilibrium → Stock is either underpriced or
$E(R) < Re$ } overpriced.

CAPM is an equilibrium model ....

This means that as per CAPM, all assets are correctly priced ∴ $E(R) = Re$

$\therefore P_0 = IV_0$

But in real life (as well as in CA Exams), there can be temporary period of mispricing

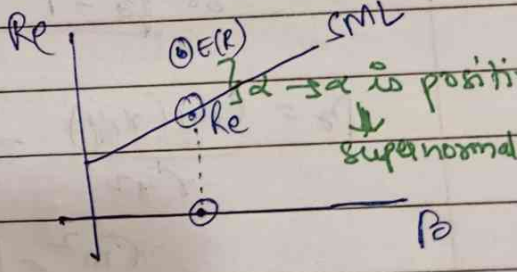
$E(R) \neq Re$

$P_0 \neq IV_0$

Case I: $E(R) > Re$ [Pls think IRR > Kc] → acha project hai

$\therefore P_0 < IV_0$

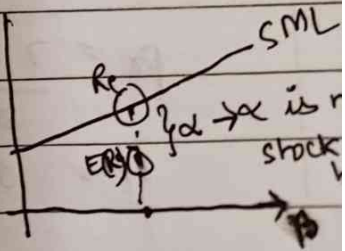
Stock is underpriced



Case II: $E(R) < Re$ [Pls think IRR < Kc]

i.e. $P_0 > IV_0$ → faltu project hai

Stock is overpriced



V.V. Imp

In certain sums, we have to use "SML" i.e. $R_f + (R_m - R_f)\beta_e$ to calculate E(R).

This seems to be wrong because $R_f + (R_m - R_f)\beta_e$ is actually the equation of R_e [not E(R)]. However, as I mentioned above, if we assume equilibrium —

$$E(R) = R_e = R_f + (R_m - R_f)\beta_e$$

CASE STUDY 1

Equilibrium Return = 12%. $[E(R) = R_e] \rightarrow \beta = 1$

Market Return = 12%.

Galat ✗ hai conceptually — 6%. Treasury bond trading at ₹120 $\longrightarrow R_f = \frac{6}{120}$

Co-var of Market return & Sec. return 196% = 5%

Coefficient of correlation = 0.80

should be of 2

Q1. SD of Market?

Since E(R) of the stock = R_m

$\therefore \beta = 1$

For desired price

$E(R) = R_f + (R_m - R_f)\beta$

$12 = 5 + (12-5)\beta$

$12 = 5 + 7\beta$

$\therefore \beta = 1$

$\beta = \frac{Cov(x,y)}{\sigma_x^2} = 1$

$\sigma_m^2 = 196$

$\sigma_m = 14\%$

(OR)

$\beta = \frac{r\sigma_y}{\sigma_x}$

$1 = \frac{0.8 \times \sigma_y}{14}$

$\therefore \sigma_y = 17.5\%$ (Ans) ✓

CASE STUDY 2

$\beta = 1.40$ $R_m = 14\%$ $R_f = 10\%$

Q1. E(R) as per CAPM :-

$E(R) = R_f + (R_m - R_f)\beta$
$= 10 + (14-10) \times 1.4$
$= 15.6\%$ (c) Ans

Q2. Risk Premium on Mkt ↑ by 2.5%, Revised E(R) = ?

$R_m - R_f = 4 + 2.5 = 6.5\%$

$E(R) = R_f + (R_m - R_f)\beta$
$= 10 + 6.5 \times 1.4$
$= 19.1\%$ (b) Ans

CASE STUDY 3

Stock	A	B	C
	underpriced ↑ ∵ IRR > Ke	overpriced ↑	correct ↑
(IRR) E(R)	18	11	15
β	1.7	0.6	1.2
Ke R_e	17.5	12	15

$R_f = 9\%$, $R_m = 14\%$ } = 5 ∴ $R_e = 9 + 5\beta$

Q1. R_e on A? $= 9 + 5\beta$
$= 9 + 5 \times 1.7$
$= 17.5\%$ (a)

Q2. R_e on B $= 9 + 5 \times .6$
$= 12\%$ (b)

Q3 R_e on C ?

$= 9 + 5 \times 1.2$

$= 15\%$ (b)

Q4. Which stock is undervalued, overvalued & correctly valued?

A → undervalued (α +ve = 0.5) (IRR > K_c)
B → overvalued (α -ve = -1) (IRR < K_c)
C → correctly valued (α = 0) (IRR = K_c)

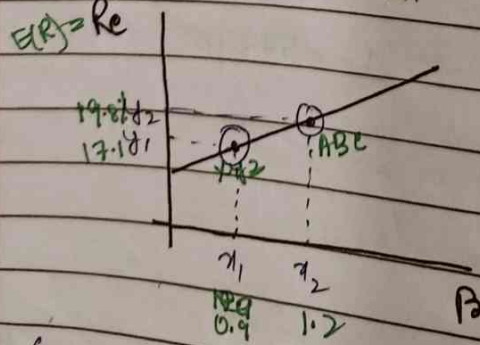
} d

Descriptive

Stocks	β	$R_e = 9 + 5\beta$	E(R)	α = E(R) − R_e	Status
A	1.7	17.5	18	0.5	Undervalued
B	0.6	12	11	−1	Overvalued
C	1.2	15	15	0	Correctly valued

CASE STUDY 4

SML based on Simultaneous Equation



Correctly priced ∴ $E(R) = R_e$

Q1. R_f & R_m ?

SML :

$$E(R) = R_f + (R_m - R_f)\beta$$

ABC

$$19.8 = R_f + (R_m - R_f)1.2 \quad \ldots (I)$$

XYZ

$$17.1 = R_f + (R_m - R_f)0.9 \quad \ldots (II)$$

$$2.7 = (R_m - R_f)0.3$$

$$R_m - R_f = \frac{2.7}{0.3}$$

$$R_m - R_f = 9\%$$

Putting this in Eqn (I) :

$$19.8 = R_f + 9 \times 1.2$$

$$\therefore R_f = 9\% \quad \text{(Ans)} \quad \text{(a)}$$

$$\therefore R_m - R_f = 9\%$$

$$\therefore R_m - 9 = 9\%$$

$$\therefore R_m = 18\% \quad \text{(Ans)} \quad \text{(a)}$$

Q2. Eqn of SML ?

$$E(R) = 9 + 9\beta \quad \text{(a)}$$

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Ambiguous Q.

PRACTICE QUESTION

CAPM :—

$$E(R) = R_f + (R_m - R_f)\beta$$

$$15.5\% = 4.45 + (12\% - 4.45)\beta$$

$$\therefore \beta = 1.46$$

$$R_f = \frac{4.3 + 4.6}{2} = 4.45$$

V.V. Imp → EXTRA QUESTIONS - NOV 24 RTP (not in book)

Ambiguous

CASE STUDY

Confusion related to "α"

CL : $\boxed{R_j = \alpha + \beta R_m}$

Nuspring $\alpha = E(R) - R_e \rightarrow R_f + (R_m - R_f)\beta$

↓ useful in all sums mostly

Conceptually $\alpha = E(R) - R_e$

↳ This is very Imp.

But in certain sums of ICAI, when they want us to calculate "α", they calculate —

$$R_j = \alpha + \beta R_m$$

↳ ✓

• Mkt Return	X Aggressive	Defensive	Y Prob	XY
7	4	9	0.5	2
25	40	18	0.5	20

$\beta = \frac{36}{18} = 2$ $\quad \frac{9}{18} = 0.5$

Q1. β of Defensive =

$$\beta = \frac{y_2 - y_1}{x_2 - x_1} = \frac{18-9}{25-7} = \frac{9}{18} = 0.5 \text{ (b)}$$

Q2. Aggressive stock E(R) when prob = 0.5

$= 0.5 \times 4 + 0.5 \times 40$

$= 22\%$ (C)

Q3 α of Defensive stock –

$R_j = \alpha + \beta R_m$

$R_j = \frac{9+18}{2} = 13.5$, $\beta = 0.5$, $R_m = \frac{7+25}{2} = 16$

~~∴ α = 5.5~~

$13.5 = \alpha + 0.5 \times 16$

$\alpha = 5.5$ (C)

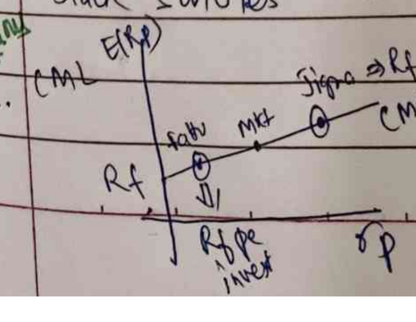
Q4. MPT profounded by Harry Markowitz.

~~Q5.~~ CAPM " " William Sharpe

~~Q6.~~ APT " " Stephen Ross

Black Scholes → Option Pricing

Ambiguous

Q5. 

Ambiguous As per CML Theory, the Portfolios l... the CML over the mkt portfolio are ... ← Diversified Portfolios.

conceptually ans is borrowing por...