✳ Ambiguous Sums on CAPM :-

◦ Type 1 :-

Given - Stock price & Dividend per share
Market Index & Dividend yield
Rf
} past data.

→ Case 1 : Calculate Beta (CW · Q · 67] pg · 71)
Beta Implicit

→ Case 2 : Calculate Beta & state your observation
Beta regression (HW · Q · 29, 30, 33)

→ Case 3 : 4 part wala Q. (HW · Q · 36 · pg · 45)
Calculate E(R) of stock
Calculate E(R) of mkt
Rf
β
} same as case 1
Beta Implicit

Case 2 : Observations - Actual Return vs. Expected Return
Action : Buy / Sell.
↳ $Re = Rf + (Rm - Rf)\beta$

Q · 67	pg
CW · 71	

In this Q., icai requires us to calculate market implicit Beta i.e. β will be reverse calculated from SML formula → $Re = Rf + (Rm - Rf)\beta$

→ Step 1 : Calculation of Rm -

(a) Average Capital Gain yield i.e. CAGR

$1768 = 1300\,(1+g)^4$

$\therefore g = \left[\frac{1768}{1300}\right]^{1/4} - 1 = 7.99\%$

$\therefore g = 8\%$

(b) Average Dividend yield $= \frac{3+5+5.5+4.75+5.5}{5}$

$= 4.75\%$.

R_m = Capital Gain yield + Dividend yield

$= 8 + 4.75$

$= 12.75\%$.

→ Step 2: Calculate average return on stock.

(a) Average capital Gains yield

$g = \left[\frac{203.51}{139}\right]^{1/4} - 1 = 10\%$.

(b) Average Dividend yield

Years	Price	Dividend	Dividend yield
2010	139	7	$7/139 \times 100 = 5.035\%$.
2011	147	8.5	$8.5/147 \times 100 = 5.782\%$.
2012	163	9.0	$9/163 \times 100 = 5.521\%$.
2013	179	9.5	$9.5/179 \times 100 = 5.307\%$.
2014	203.51	10	$10/203.51 \times 100 = 4.914\%$.
			26.5598

$\therefore$ Avg. Div. yield $= \frac{26.5598}{5} = 5.312\%$.

Average Return on stock $= 10 + 5.312 = 15.312\%$.

→ Step 3: As per CAPM, $R_e = R_f + (R_m - R_f)\beta$

$R_f = \frac{7+9+8+8+8}{5} = 8\%$.

$15.312 = 8 + (12.75 - 8)\beta$

$\therefore \beta = 1.54$

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Beta Regression : Type 1 Calc 2 wala sum :-

$$\text{Return} = \frac{\text{Dividend} + \text{Price change}}{\text{Initial Price}} \times 100$$

(i) Return on stock - (y)

Year	Returns (y)
2012-13	$\frac{22 + (253-245)}{245} \times 100 = 12.24\%$
2013-14	$\frac{25 + (310-253)}{253} \times 100 = 32.41\%$
2014-15	$\frac{30 + (330-310)}{310} \times 100 = 16.13\%$

(ii) Return on market Index - (x)

Year	Capital Gain Yield	Div. yield	Return (x)
2012-13	$(2130-2013)/2013 \times 100 = 5.81\%$	5%	10.81%
2013-14	$(2350-2130)/2130 \times 100 = 10.33\%$	6%	16.33%
2014-15	$(2580-2350)/2350 \times 100 = 9.79\%$	7%	16.79%

(iii) Calculation of Beta - (β)

Year	Mkt Return (x)	Krishna Ltd. (y)	x^2	xy
2012-13	10.81	12.24	116.86	132.31
2013-14	16.33	32.41	266.67	529.26
2014-15	16.79	16.13	281.90	270.82
	43.93	60.78	665.43	932.39

$$\bar{x} = \frac{43.93}{3} = 14.64\% \qquad \bar{y} = \frac{60.78}{3} = 20.26\%$$

$$\beta = \frac{\Sigma xy - n\bar{x}\cdot\bar{y}}{\Sigma x^2 - n\bar{x}^2} = \frac{932.39 - 3 \times 14.64 \times 20.26}{665.43 - 3 \times 14.64} = 1.897$$

→ Observations :-

$Re = Rf + (Rm - Rf)\beta$

Year	Actual Return	Expected as per CAPM	Action
2012-13	12.24	$6 + (10.81 - 6) \times 1.897 = 15.12$	Sell*
2013-14	32.41	$6 + (16.33 - 6) \times 1.897 = 25.60$	Buy#
2014-15	16.13	$6 + (16.79 - 6) \times 1.897 = 26.47$	Sell*

(*) Sell → Bad performance → Re > Actual return

(#) Buy → Good performance → Re < Actual return

Self practice: HW. Q.33, Q.30] pg. 44, 43

◦ Type 2 :- (Total wala sum)

Security	Cost	Dividend / Interest	Market Price	β
A	xx	xx	xx	xx
B	xx	xx	xx	xx
C	xx	xx	xx	xx
G. Sec.	xx	xx	xx	xx
	xxx	xxx	xxx	xxx

↑ β

$Rm = \frac{\text{Dividend + Appreciation}}{\text{Total cost}}$

β_p = simple avg.

① Rf = ?? , Rp = xx ... given

Expected Return for each security = ?? (Average return)

② Rf = xx ... given

Calculate E(Rp) → $Re = Rf + (Rm - Rf)\beta$

Average Return on portfolio → simple average.

Q. 61 | pg
CW. 69

Type 2 : Total wala sum

Shares	Cost (₹)	Dividend	Market Price	Beta
A	30000	5000	33000	0.7
B	40000	4000	42000	0.9
C	20000	2000	23000	0.8
D	15000	2250	14000	1.1
G. Bond	50000	5000	52000	1.0
	155000	18250	164000	4.5

Return on market portfolio (Rm) = $\frac{18250 + (164000 - 155000)}{155000} \times 100$

$= 17.58\%$

$$\left[Rm = \frac{\text{Dividend + Appreciation}}{\text{Investment}} \times 100 \right]$$

Simple Avg. Beta of Portfolio (βp) = $\frac{4.5}{5} = 0.90$

Given : $R_p = 14\%$

As per CAPM, $R_p = R_f + (R_m - R_f)\beta$

$14 = R_f + (17.58 - R_f)\,0.90$

$R_f = -18.22$ .... sum wrongly designed

Expected Return of each investment :-

Shares	Beta	Expected Return ($R_e = R_f + (R_m - R_f)\beta$)
A	0.7	$-18.22 + (17.58 + 18.22)\,0.7$ =
B	0.9	$-18.22 + (17.58 + 18.22)\,0.9$ =
C	0.8	$-18.22 + (17.58 + 18.22)\,0.8$ =
D	1.1	$-18.22 + (17.58 + 18.22)\,1.1$ =
G. Bond	1.0	$-18.22 + (17.58 + 18.22)\,1.0$ =

self practice : HW. Q. 36) pg. 45