

Chapter Tests of SFM of CA Ashish Lalaji 9825856155

Solution of Test of Bonds

Q 1

(i) Straight Value of Bond

$$\text{Rs. } 85 \times 0.9132 + \text{Rs. } 85 \times 0.8340 + \text{Rs. } 1085 \times 0.7617 = \text{Rs. } 974.96$$

(ii) Conversion Value

$$\begin{aligned} &\text{Conversion Ratio} \times \text{Market Price of Equity Share} \\ &= \text{Rs. } 45 \times 25 = \text{Rs. } 1,125 \end{aligned}$$

(iii) Conversion Premium

$$\begin{aligned} \text{Conversion Premium} &= 1,175 - 1,125 = \text{Rs. } 50 \\ \text{or } 50 / 1,125 &= 4.44\% \end{aligned}$$

(iv) Percentage of Downside Risk

$$1,175 - 974.96 / 974.96 = 20.52\%$$

(v) Conversion Parity Price

$$1,175 / 25 = \text{Rs. } 47$$

Q 2

(i) Calculation of Bond Duration

Bond A

Year	Cash flow	P.V. @ 9%	Year X PV
1	10	0.917	9.17
2	10	0.842	16.84
3	10	0.772	23.16
4	10	0.708	28.32
5	10	0.650	32.50
6	10	0.596	35.76
7	10	0.547	38.29
8	10	0.502	40.16
9	10	0.460	41.40
10	110	0.4224	46.46
			<u>106.40</u>
			<u>730.20</u>

$$\text{Duration} = 730.2 / 106.4 = 6.86 \text{ years}$$

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Bond B

Year	Cash flow	P.V. @ 9%		Year X PV
1	11	0.917	10.087	10.087
2	11	0.842	9.262	18.524
3	11	0.772	8.492	25.476
4	11	0.708	7.788	31.152
5	11	0.650	7.150	35.750
6	11	0.596	6.556	39.336
7	11	0.547	6.017	42.119
8	111	0.502	<u>55.772</u>	<u>446.176</u>
			<u>111.224</u>	<u>648.620</u>

Duration = $648.62 / 111.224 = 5.83$ years

Bond C

Year	Cash flow	P.V. @ 9%		Year X PV
1	9	0.917	8.253	8.253
2	9	0.842	7.578	15.156
3	9	0.772	6.948	20.844
4	9	0.708	6.372	25.488
5	109	0.650	<u>70.850</u>	<u>354.25</u>
			<u>100.00</u>	<u>423.99</u>

Duration = $423.99 / 100 = 4.24$ years

(ii) Amount of Investment required in Bond B and C

Period required to be immunized	6.000 Year
Less: Period covered from Bond A (6.86 X 45%)	3.087 Year
To be immunized from B and C	2.913 Year

Let proportion of investment in Bond A, Bond B and C be 0.45, b and 0.55 - b respectively then -

$$6.86 (.45) + 5.83b + 4.24 (.55 - b) = 6$$

$$3.087 + 5.83b + 2.332 - 4.24b = 6$$

$$1.59b = 0.581$$

$$b = 0.3654 \text{ i.e. } 36.54\%$$

Proportion in Bond B is 36.54 % and in C is 18.46%

(iii) With revised yield the Revised Duration of Bond stands

$$0.45 \times 7.15 + 0.3654 \times 6.03 + 0.1846 \times 4.27 = 6.21 \text{ years}$$

Portfolio is now no longer immunized as the duration of the portfolio has increased from 6 years to 6.20 years.

(iv) New percentage of B and C bonds that are needed to immunize the portfolio:

Let proportion of investment in Bond A, Bond B and C be 0.45, b and 0.55 - b respectively then -

$$\begin{aligned}7.15 (.45) + 6.03b + 4.27 (.55 - b) &= 6 \\3.2175 + 6.03b + 2.3485 - 4.27b &= 6 \\1.76b &= 0.434 \\b &= 0.2466 \text{ i.e. } 24.66\%\end{aligned}$$

Proportion in Bond B is 24.66 % and in C is 30.34%

Q 3 Calculation of Current Bond Price:

Year	Cash Inflows	PVF (15%)	PV
1 - 8	70	4.487	314.09
8	1,000	0.327	<u>327.00</u>
			<u>641.09</u>

Note: Coupon rate of interest of the bond is not given. But the bond is issued at par and hence YTM and rate of interest have to be equal. Hence, coupon rate is 7%.

Calculation of YTM:

Year	Cash Inflows	PVF (12%)	PV	PVF (13%)	PV
1 - 8	70	4.968	347.76	4.799	335.93
8	800	0.404	<u>323.20</u>	0.376	<u>300.80</u>
			670.96		636.73
			<u>641.09</u>		<u>641.09</u>
		NPV	<u>29.87</u>		<u>(4.36)</u>

$$\text{YTM} = 12 + [29.87 / 29.87 - (-4.36)] \times (13 - 12) = 12.87\%$$

Solution prepared by **CA. Ashish Lalaji**

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