

Bond Valuation

Question 47

Sabanam Ltd. has issued convertible debentures with coupon rate 11%. Each debenture has an option to convert to 16 equity shares at any time until the date of maturity. Debentures will be redeemed at ₹ 100 on maturity of 5 years. An investor generally requires a rate of return of 8% p.a. on a 5 - year security.

As an advisor, when will you advise the investor to exercise conversion for given market prices of the equity share of (i) ₹ 5, (ii) ₹ 6 and (iii) ₹ 7.10?

Cumulative PV factor for 8% for 5 years : 3.993

PV factor for 8% for year 5 : 0.681

(May 18, 6 Marks)

Solution

If Debentures are not converted its value is as under:

	PVF @ 8%	₹
Interest - ₹ 11 for 5 years	3.993	43.923
Redemption - ₹ 100 in 5th year	0.681	68.100
		112.023

Value of equity shares:

Market Price	No.	Total
₹ 5	16	₹ 80
₹ 6	16	₹ 96
₹ 7.10	16	₹ 113.60

Hence, unless the market price is ₹ 7.10 conversion should not be exercised.

Question 48

Tangent Ltd. is considering calling ₹ 3 crores of 30 years, ₹ 1,000 bond issued 5 years ago with a coupon interest rate of 14 per cent. The bonds have a call price of ₹ 1,150 and had initially collected proceeds of ₹ 2.91 crores since a discount of ₹ 30 per bond was offered. The initial floating cost was ₹ 3,90,000. The Company intends to sell ₹ 3 crores of 12 per cent coupon rate, 25 years bonds to raise funds for retiring the old bonds. It proposes to sell the new bonds at their par value of ₹ 1,000. The estimated floatation cost is ₹ 4,25,000. The company is paying 40% tax and its after tax cost of debt is 8 per cent. As the new bonds must first be sold and then their proceeds to be used to retire the old bonds, the company expects a two months period of overlapping interest during which interest must be paid on both the old and the new bonds. You are required to evaluate the bond retiring decision. [PVIFA 8%, 25 = 10.675] (8 Marks)

(Nov 18, 8 Marks)

Solution

NPV for bond refunding

	₹
PV of annual cash flow savings (W.N. 2) (3,49,600 x PVIFA 8%,25) i.e. 10.675	37,31,980
Less: Initial investment (W.N. 1)	31,15,000
NPV	6,16,980

Recommendation: Refunding of bonds is recommended as NPV is positive.

Working Notes:

1. Initial investment:

a. Call premium

Before tax (1,150 - 1,000) x 30,000	45,00,000
Less tax @ 40%	18,00,000
After tax cost of call prem.	27,00,000

b. Floatation cost 4,25,000

c. Overlapping interest

Before tax (0.14 x 2/12 x 3 crores)	7,00,000
Less tax @ 40%	2,80,000
	4,20,000

d. Tax saving on unamortised discount on old bond

$$\frac{25}{30} \times 9,00,000 \times 0.4 = (3,00,000)$$

e. Tax savings from unamortised floatation

Cost of old bond

$$\frac{25}{30} \times 3,90,000 \times 0.4 = (1,30,000)$$

Total **31,15,000**

2. Annual cash flow savings:

a. Old bond

i.	Interest cost (0.14 x 3 crores)	42,00,000
	Less tax @ 40%	16,80,000
		25,20,000
ii.	Tax savings from amortisation of discount (9,00,000/30 x 0.4)	(12,000)
iii.	Tax savings from amortisation of floatation cost (3,90,000/30 x 0.4)	(5,200)

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Annual after-tax cost payment under old Bond (A)	25,02,800
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b. New bond

i.	Interest cost before tax (0.12 X 3 crores) Less tax @ 40%	36,00,000 14,40,000
ii.	After tax interest	21,60,000
	Tax savings from amortisation of floatation cost (0.4 X 4,25,000/25)	(6,800)
	Annual after-tax payment under new Bond (B)	21,53,200
	Annual Cash Flow Saving (A) - (B)	3,49,600

Question 49

The following data are available for three bonds A, B and C. These bonds are used by a bond portfolio manager to fund an outflow scheduled in 6 years.

Current yield is 9%. All bonds have face value of ₹100 each and will be redeemed at par. Interest is payable annually.

Bond	Maturity (Years)	Coupon rate
A	10	10%
B	8	11%
C	5	9%

- i. Calculate the duration of each bond.
- ii. The bond portfolio manager has been asked to keep 45% of the portfolio money in Bond A. Calculate the percentage amount to be invested in bonds B and C that need to be purchased to immunise the portfolio.
- iii. After the portfolio has been formulated, an interest rate change occurs, increasing the yield to 11%. The new duration of these bonds are: Bond A = 7.15 Years, Bond B = 6.03 Years and Bond C = 4.27 years.
Is the portfolio still immunized? Why or why not?
- iv. Determine the new percentage of B and C bonds that are needed to immunize the portfolio. Bond A remaining at 45% of the portfolio.

Present values be used as follows:

Present Values	t ₁	t ₂	t ₃	t ₄	t ₅
PVIF _{0.09,t}	0.917	0.842	0.772	0.708	0.650

Present Values	t ₆	t ₇	t ₈	t ₉	t ₁₀
PVIF _{0.09,t}	0.596	0.547	0.502	0.460	0.4224

(Nov 18, 12 Marks)

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Solution

- i. Calculation of Bond Duration Bond A
Bond A

Year	Cash flow	PV @ 9%		Proportion of bond value	Proportion of bond value X time (years)
1	10	0.917	9.17	0.086	0.86
2	10	0.842	8.42	0.079	0.158
3	10	0.772	7.72	0.073	0.219
4	10	0.708	7.08	0.067	0.268
5	10	0.650	6.50	0.061	0.305
6	10	0.596	5.96	0.056	0.336
7	10	0.547	5.47	0.051	0.357
8	10	0.502	5.02	0.047	0.376
9	10	0.460	4.60	0.043	0.387
10	110	0.4224	46.46	0.437	4.370
			106.40	1.000	6.862

Duration of the bond is 6.862 years or 6.86 year

Bond B

Year	Cash flow	PV @ 9%		Proportion of bond value	Proportion of bond value X time (years)
1	11	0.917	10.087	0.091	0.091
2	11	0.842	9.262	0.083	0.166
3	11	0.772	8.492	0.076	0.228
4	11	0.708	7.788	0.070	0.280
5	11	0.650	7.150	0.064	0.320
6	11	0.596	6.556	0.059	0.354
7	11	0.547	6.017	0.054	0.378
8	11	0.502	55.772	0.502	4.016
			111.224	1.000	5.833

Duration of the bond B is 5.833 years or 5.84 years

Bond C

Year	Cash flow	PV @ 9%		Proportion of bond value	Proportion of bond value X time (years)
1	9	0.917	8.253	0.082	0.082
2	9	0.842	7.578	0.076	0.152
3	9	0.772	6.948	0.069	0.207
4	9	0.708	6.372	0.064	0.256
5	109	0.650	70.850	0.709	3.545
			100.00	1.000	4.242

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Duration of the bond C is 4.242 years or 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	3.087 Year
To be immunized from B and C	2.913 Year

Let proportion of investment in Bond B and C is b and c respectively then

$$b + c = 0.55 \quad (1)$$

$$5.883b + 4.242c = 2.913 \quad (2)$$

On solving these equations, the value of b and c comes 0.3534 or 0.3621 and 0.1966 or 0.1879 respectively and accordingly, the % of investment of B and C is 35.34% or 36.21% and 19.66 % or 18.79% respectively.

iii. **With revised yield the Revised Duration of Bond stands**

$$0.45 \times 7.15 + 0.36 \times 6.03 + 0.19 \times 4.27 = 6.20 \text{ year}$$

No portfolio is not immunized as the duration of the portfolio has been increased from 6 years to 6.20 years.

iv. **New percentage of B and C bonds that are needed to immunize the portfolio.**

Period required to be immunized	6.000 Year
Less: Period covered from Bond A	3.2175 Year
To be immunized from B and C	2.7825 Year

Let proportion of investment in Bond B and C is b and c respectively, then

$$b + c = 0.55$$

$$6.03b + 4.27c = 2.7825$$

$$b = 0.2466$$

On solving these equations, the value of b and c comes 0.2466 and 0.3034 respectively and accordingly, the % of investment of B and C is 24.66% or 25% and 30.34 % or 30.00% respectively.