

INVESTMENT ANALYSIS & PORTFOLIO MANAGEMENT

Subject Code – MBA FM314

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Module 3 – Valuation of Securities

* Valuation of Bond \Rightarrow

The term bond is a debt instrument used by the company to raise the funds from the public.

\Rightarrow Usually Bonds are term as long term. Source for raising the funds.

\Rightarrow Bond holders will get regular amount of interest given out the life of the bond and principle amount is the refunded at the end of the life of Bond.

* Valuation Bond \Rightarrow

Case $\rightarrow 1 \Rightarrow$ If the Interest is Compounded Annually.

$$P = \sum_{t=1}^n \frac{C}{(1+r)^t} + \frac{M}{(1+r)^n}$$

$P \rightarrow$ value of the bond

$C \rightarrow$ Interest or coupon rate

$R \rightarrow$ Required rate of return.

$M \rightarrow$ Implies maturity values

$n \rightarrow$ no. of year.

$$P \rightarrow (C \times PVIFA)_{r,n} + (M \times PVIF)_{r,n}$$

Case $\rightarrow 2 \Rightarrow$ If the Interest is Compounded Semiannually

$$P = C \times (PV \text{ annuity})_{r/2, 2n} + (M \times PV \text{ of one Rupee})_{r/2, 2n}$$

Problems :-

- ① A 500 Rupees par value bond bearing a coupon rate of 12% will mature after 5 years. What is the value of the bond if the discount rate is 15%.

Ans:-

Face value $P = Rs = 500$.

Coupon rate $C = 12\%$ $= \frac{500 \times 12}{100} = 60 //$

$$P = (C \times PVIFA)_{r,n} + (M \times PVIF)_{r,n}$$

$$= 60 \times PVIFA_{15\%, 5 \text{ years}} + (500 \times PVIF)_{15\%, 5 \text{ years}}$$

$$= 60 \times 3.352 + (500 \times 0.4972)$$

$$= 201.132 + 248.6$$

$$\boxed{\text{Ans} = 449.732 //}$$

- ② A Rupees 100 par. value bond bearing coupon rate 12% will mature after 5 years. What is the value of the bond if the discount rate is 15%.

Ans:- Face Value $P = 100$

$C = 12\%$

$$\frac{100 \times 12}{100} = 12 //$$

$n = 5 \text{ years}$

$r = 15\%$

$$P = (C \times PVIFA)_{r,n} + (M \times PVIF)_{r,n}$$

$$= (12 \times PVIFA)_{15\%, 5 \text{ years}} + (100 \times PVIF)_{15\%, 5 \text{ years}}$$

$$= (12 \times 3.352) + (100 \times 0.4972)$$

$$= 40.2264 + 49.82$$

$$\boxed{= 89.9464 //}$$

- ③ A Rupees 1000 par value bond bearing a coupon rate 10% will mature after 5 years at premium of 25%. presently these bonds are sold in the market at Rs 900. If the discount rate is 15%, State your advice to the investors

present S.B.V = 900

$p = 1000$
 $r = \text{Interest rate}$

$P = 1000$
 $C = 1000 \times \frac{10}{100} = 100$
 $n = 5$
 $r = 15\%$
 $m = \frac{1000}{25\%} = 4$
 $= 1000 + 250 = 1250$

$$P = (C \times PVIFA) + (m \times PVIF)$$

$$= (100 \times 3.3522) + (1250 \times 0.4972)$$

$$= 335.22 + 621.5$$

$$= 956.72$$

Comment \Rightarrow Since the real value of the bond is more than present selling price of the bond, so it is advisable to the investor, purchase the bond.

- ④ Arvind is considering buying a Rs 1000 par value bond bearing a coupon rate of 11% that mature after 5 years. he wants a minimum yield to maturity (VTM) of 15%. The bond is currently sold at Rs 870. Should he buy the bond?

$M = \text{Rs} = 1000$
 $C = 11\% = 0.11 \times 1000 = 110$ $n = 5$
 $P = (110 \times 3.3522) + (1000 \times 0.4972)$
 $= 368.742 + 497.2$
 $= 865.942$

Comment : At Anand's anticipation minimum yield 15%. Hence, he should not buy. The price should be 86594 but the market price is higher. Hence, he should not buy.

- 5] Anmol owns RS 1000 face value bond with 5 years to maturity. The bond has annual coupon RS 75. The bond is currently priced at RS 970. Given an appropriate discount rate 10%, should Anmol hold or sell the bond.

Ans:

$$\text{Face value} = 1000$$

$$C = 75$$

$$n = 5$$

$$r = 10\%$$

$$P = (75 \times 3.7906) + (1000 \times 0.6809)$$

$$= 284.292 + 680.9$$

$$\boxed{\text{Actual value} = 965.195}$$

Comment : As the bond is currently priced at 970 so Anand has to sell the bond.

- The market price of 970 is higher than the calculated value or actual value 965.195. So it is better for Anmol to sell the bond.

Duration and price changes :-

The price of a bond changes according to the interest changes. These bond price changes are commonly called bond volatility.

→ Duration analysis helps to determine the changes in bond price as the yield to maturity changes.

→ The relationship between the duration of a bond price volatility as the market interest rate changes is given by the following formula.

$$\% \text{ change in price} = \frac{-MD[ABP]}{100}$$

MD = Modified duration

Bp = Basis point is 0.01 of 1% percentage

Δ → change in interest rate ↓ fx rate

$$\% \text{ Modified duration } MD = \frac{D}{1 + \frac{R}{P}}$$

D → Duration

R → market yield

P → interest payment per year.
(usually two).

Problem 8 :-

Calculate the duration for bond A and Bond B with 7% and 8% coupons having a maturity period of 4 years. the face value is Rupees 1000, both the bonds are currently in 6%.

Calculation of duration for Bond A :-

Bond A = 7%

$$D = \sum_{t=1}^n \frac{PV(Ct)}{P_0} \times t$$

where

D = Duration

C = cashflow

t = no of years

P₀ = Sum of present value of cashflow

$$1000 \times \frac{7}{100} = 70 //$$

Bond A coupon rate 7%

years	cash flow	PVIFA	PV X Ct	$\frac{PV Ct}{P_0}$	$\frac{PV Ct}{P_0} \times t$
1	70	0.9434	66.038	0.063	0.063
2	70	1.8000	62.3	0.060	0.12
3	70	0.8396	58.779	0.056	0.168
4	1070	0.7991	55.447	0.819	3.276
			1034.657		D = 3.627

Calculation of Duration of Bond (B) coupon rate 8%

year	Cashflow	PVIFA	PV X Ct	$\frac{PV Ct}{P_0}$	$\frac{PV Ct}{P_0} \times t$	
1	80	0.9434	75.472	0.070	0.070	81
2	80	0.8900	71.2	0.066	0.132	1000 x 8
3	80	0.8396	67.168	0.062	0.186	100
4	1080	0.7991	855.46	0.800	3.2	= 80 //
					D = 3.588	

particulars	Bond A	Bond B
Face Value	1000	RS. 1000
Coupon rate	7%	8%
Years to maturity	4 years	4 years
Duration	3.627 years	3.592 years

From this Example it is clear that the bond with higher coupon payments has a shorter duration compared to the bond A with a lower coupon rate.

Modified duration :-

Amun buys a bond with 4 years to maturity. The bond has a coupon rate of 9% and is priced at RS = 100 in the market.

(A) What is the duration of Bond?

(B) What will be the change in the price of the bond if the interest rate rises by one 1%?

Duration of Bond.

Year	Cashflow	PVIF	PVIF \times CF	$\frac{PVCF}{P_0}$	$\frac{PVCF}{P_0} \times t$
1	9	0.9174	8.256	0.082	0.082
2	9	0.841	7.575	0.075	0.15
3	9	0.7722	6.94	0.069	0.207
4	109	0.7084	77.31	0.773	3.088
			$P_0 = 99.99$		$D = 3.527$

$$D = \sum_{t=1}^n \frac{PV(CF_t)}{P_0} \times t$$

$$D = 3.527 \text{ years}$$

B) Percentage
percentage change in price $= \frac{MD [\Delta BP]}{100}$

$$\text{Modified Duration} = MD_{\sigma} = \frac{D}{1+r}$$

$$= \frac{3.53}{1+9\%}$$

$$D = 3.53$$

$$r = \text{market yield} = 9\% = \frac{3.53}{10}$$

$$P = \text{Interest payment per} = 9\% = \frac{10}{9}$$

$$= \frac{3.53}{1.11}$$

$$\boxed{\text{Ans} = 3.180}$$

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* valuation of Semiannually :-

- ① A RS 500 par value 14% and mature after 5 years. The interest is payable semiannually. these bonds are sold in the market at present 450 will you purchase the bond if you are required rate of return is 16%.

Ans:-

$$\text{Face value} = 500/-$$

$$\text{Interest rate} = 14\%$$

paid semiannually

$$\text{Life} = 5 \text{ years}$$

$$\text{Present value} = 450/-$$

$$500 \times \frac{14}{100} \times \frac{6}{1}$$

$$= 35/-$$

Since the Interest & Payment semiannually.

$$P = (C \times PVIFA)^{A=4} + (M \times PVIF)^{A=3}$$

$\frac{16\%}{2} \times 4$ $\frac{16\%}{2} \times 4$

$$P = (35 \times PVIFA)^{16\% \times 4} + (500 \times PVIF)^{16\% \times 4}$$

$$P = (35 \times 6.710) + (500 \times 0.463)$$

$$P = 234.8 + 231.6$$

$$P = 466.4 //$$

$$RSI = 100 - \left(\frac{100}{1 + 4.33} \right)$$

$$= 100 - \left(\frac{100}{5.33} \right)$$

$$= 100 - 18.76$$

$$RSI = 81.24$$

Valuation of shares :-

I Zero growth model :-

means no growth model.

$$P_0 = \frac{D_1}{r} \quad \text{or} \quad P_0 = \frac{D_1}{K_e}$$

P_0 = price of the equity share today.

D_1 = dividend expected a year hence
(Next year dividend)

r = required rate of return.

K_e = required rate of return.

II Constant Growth model :-

$$P_0 = \frac{D_1}{r - g}$$

D_1 = expected

D_0 = present (current)

Conditions :-

(1) Growth Rate should Not exceed required Rate of return that is $r > g$ (But g can not be greater than r) $\Rightarrow g < r$.

Q. Rs 50 share it is expected that the co. will pay a dividend was pay Rs 2. It the required rate of return is 10%. what is the growth rate?

Soln:

$$P_0 = 50$$

$$D_1 = 2$$

$$r = 10\% = 0.10$$

$$g = ?$$

$$P_0 = \frac{D_1}{r - g}$$

$$50 = \frac{2}{0.10 - g}$$

$$50(0.10 - g) = 2$$

$$5 - 50g = 2$$

$$5 = 50g + 2$$

$$3 = 50g$$

$$g = \frac{3}{50}$$

$$g = 0.06 \times 100$$

$$g = 6\%$$

Q. The expected dividend/share on the share of Road King Ltd is Rs 2. The dividend per share has growth over the next 5 years. @ 5% year. This growth rate will continue in future further the market price of the equity rate is also expected to grow @ the same rate where is the fair.

Estimate of intrinsic value of the share of Road King Ltd. if the required rate is 15%.

(Determinative of actual value prevail in the market = intrinsic share)

Intrinsic value of the share.

Expected dividend $d_1 = 2$

Growth $g = 5\% = 0.05$

$r = 0.15 //$

$$P_0 = \frac{D_1}{r - g}$$

$$P_0 = \frac{2}{(0.15 - 0.05)}$$

$$= \frac{2}{0.1}$$