



Revision
CA Final
STRATEGIC FINANCIAL MANAGEMENT
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Chapter 2 : SECURITIES VALUATION - II

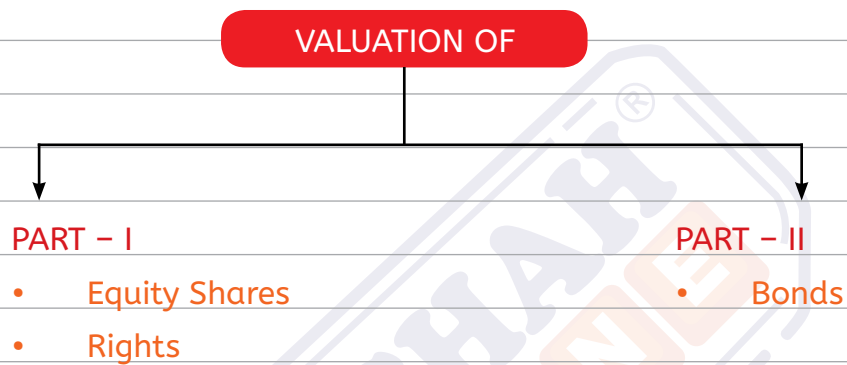
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CHAPTER FRAMEWORK

The Chapter of “Securities Valuation” is divided into 2 main parts:





1. INTRODUCTION

1. A bond is a fixed income instrument issued by a government or a business house. Bonds are issued for variety of purposes. It can be issued by companies for the purpose of raising finance which can be used for the expansion of the business. Bonds can be issued either for a new project or expansion of existing one.
2. Bonds traditionally carry a fixed coupon rate. In current scenario, bonds with floating interest rates are common.
3. Bonds can be traded in the market and hence an investor needs to value a bond before acquiring it. Every bond will have some component of risk which needs to be analysed before making investments. Hence, credit ratings of bonds are extremely important for an investor.
4. Investment in bonds can be done directly or indirectly. An investor can invest in debt oriented mutual funds. Such mutual funds invest in bonds of various companies. An investor can also directly purchase the bonds traded in the market. Investment in bonds can be made through a broker with the help of d- mat account.
5. If the credit rating of a particular bond is good, then interest rate offered will be relatively lower as an investor is taking lower risk. Similarly, secured bonds offer lower interest as compared to unsecured bonds, as the risk element is relatively higher in the latter case.
6. Value of bond or its Intrinsic Value is summation of present value of its cash inflows discounted at required rate of return of an investor.
7. When an investor purchases a Bond he pays to the seller 2 things :
 1. The basic price of the Bond; and
 2. Accrued Interest (coupon) from the last Interest payment date till the day preceding the date of transaction.

In case of a Government Bond, while calculating Accrued Interest, the year has always got to be taken as 360 days. In the normal course of trading, the Bond prices are always quoted without taking into account the accrued interest - such price is known as clean price. The accrued interest is then computed separately.

In the rare situation, where the price quoted includes the amount of accrued interest - such price is called as dirty price.

8. Bonds can be also issued with semi - annual terms. In such a situation, interest will be received semi-annually. To calculate the value of bond, following are the 3 changes to be made:
- a) Interest rate will be divided into 2.
 - b) Expected rate of return or required rate will be divided into 2.
 - c) Terms will be multiplied by 2.



2. IMPORTANT TERMS

1. **Par value:** Value stated on the face of the bond. It is the value on which the coupon is paid. Normally bonds have a face value of ₹ 100, though it is not uncommon to see bonds having a face value of ₹ 1000.
2. **Coupon Rate:** A bond carries a specific interest rate known as the coupon rate -unless it is a Zero Coupon Bond (in which case there is no coupon). The coupon payable to the bond holder is found by Coupon rate x par value of bond. For example if a bond carries a coupon of 11% and has a face value of ₹ 100 and the coupon is paid annually then the amount of coupon payable to the bond holder annually will be $0.11 \times 100 = ₹ 11$. The frequency of the coupon payment is specified at the time of issue of bonds. Normally the coupon is paid annually or half yearly.
3. **Maturity Period :** Maturity period refers to the period for which the bond is issued. Usually corporate bonds have maturity period ranging from 3 years to 10 years while government bonds have maturity ranging from 1 year to 30 years (in India).
4. **Yield and its types:** Yield in general term means returns. Yield is the return which an investor expects to earn from the bond. This is not to be confused with coupon. Coupon is what the bond issuer promises to pay while yield is the return that an investor expects and these two need not be the same. The yield rate refers to the rate at which the investor is prepared to discount the cash flows from the bond for valuing the bond. This is also referred to as the required rate of return from the bond.
Following are the types of yields:
 - a) **Nominal Yield:** It is the coupon rate which is prefixed to a particular bond. Eg 8 % Bonds. Therefore, coupon rate is the nominal yield.
 - b) **Yield to Maturity:** The YTM is return that an investor earns by buying a bond at a particular price and holding it till maturity. YTM is the actual rate of return which an investor earns if he invests it at actual market price and redeems it.

YTM is similar to internal rate of return. At YTM, all the present value of cash inflows is equal to the actual price of the bond. YTM is also defined as the discount rate at which all the cash inflows equate to actual price of the bond.

Approximate YTM can be calculated by using the following formulae:

$$\text{YTM} = \frac{\left\{ \text{Interest} + \frac{\text{Redemption Value} - \text{Purchase Price}}{\text{No of years}} \right\}}{\left\{ \frac{\text{Redemption Value} + \text{Purchase Price}}{2} \right\}}$$

- c) **Current Yield:** It is the rate of return which the investor earns if the holding period is considered to be a year. It is dividend per annum earned to the actual market price of bond.

$$\text{Current Yield} = \frac{\text{Interest p.a.}}{\text{Actual Bo.}}$$



3. BOND VALUE THEOREMS

1. Relationship between Price and Yield to Maturity:

Scenario:	Investment Decision:
If Coupon Rate = YTM	Bonds are traded at Par.
If Coupon Rate < YTM	Bonds are traded at Discount.
If Coupon Rate > YTM	Bonds are traded at Premium.

2. Relationship between Price and Expected Yield:

Scenario:	Investment Decision:
If Coupon Rate = Expected Yield	Bonds are valued at Par.
If Coupon Rate < Expected Yield	Bonds are valued at Discount.
If Coupon Rate > Expected Yield	Bonds are valued at Premium.

3. Relationship between Expected or Intrinsic Value and Actual Price of the bond.

Scenario:	Investment Decision:
If Intrinsic Value = Actual Price	Indifferent or Purchase as target is met.
If Intrinsic Value < Actual Price	Investment should not be made.
If Intrinsic Value > Actual Price	Investment should be made.

4. Relationship between YTM and Expected Yield:

Scenario:	Investment Decision:
If YTM = Expected Yield	Indifferent or Purchase as target is met.
If YTM < Expected Yield	Investment should not be made.
If YTM > Expected Yield	Investment should be made.

PRACTICAL PROBLEMS

- Q1.** A is willing to purchase a 5 years Rs. 1000 par value bond having a coupon rate of 9%. A's required rate of return is 10%. How much A should pay to purchase the bond if it matures at par.
- Q2.** A PSU is proposing to sell a 8 years bond of Rs. 1000 at 10% coupon rate per annum. The bond amount will be amortised equally over its life. If an investor has a minimum required rate of return of 8%, what is the bond's present value.

- Q3.** Based on the credit ratings of bonds Mr Z has decided to apply the following discount rates for valuing bonds:

Credit rating	Discount rate
AAA	364 day TBill + 3% spread
AA	AAA + 2% spread
A	AAA + 3% spread

He is considering to invest in AA rated Rs. 1000 face value bond, currently selling at Rs. 1025.86. The bond has 5 years to maturity and coupon rate is 15% payable annually. The next interest payment is due one year from today and the bond is redeemable at par. (Assume 364 day TBill yield = 9%). You are required to calculate intrinsic value of the bond for Mr Z. Should he invest in the bond? Also calculate the current yield and YTM of the bond.

- Q4.** A bond pays Rs. 90 interest annually into perpetuity.
- What is its value if the current yield is 10%
 - If the current yield changes to 8% and 12% then what is its value.
- Q5.** On June 1, 2003 the financial manager of ABC Corporation's Pension fund trust is reviewing strategy regarding the fund. Over 60% of the fund is invested in fixed rate long term bonds. Interest rates are expected to be quite volatile for the next few years. Among the funds current investments are two AA rated bonds:
- Zero coupon bond 2018
 - 12% Gilt 2018 (interest is payable semi annually)

The current annual market interest rate on both bonds is 6%. The effective semi annual yield may be assumed at 3%. Both the bonds have a par value and redemption value of Rs. 100. Estimate the market price of each of the bonds at the current market interest rates.

Q.6. The bonds of Texas Industries of face value ₹ 100 with 10% coupon paid semi annually is presently selling at 5% discount on the face value. These bonds will be redeemed at par by equal installments at the end of 5th and 6th years. The effective tax rate of Texas is 40%. What is the YTM of the bond.

Q7. HUDCO issue 1 crore bonds of ₹ 1000 each in the market on 1-4-97 at par with a maturity date of 31-3-2007. These bonds carry a coupon of 14% which are payable half yearly. You are required to calculate the following:

- YTM on the date of issue if these are redeemed at par.
- Market value per bond as on 1-4-2002 if the interest rate prevailing in the economy is 11%
- If these bonds are purchased at the price calculated in (ii) above, what is the current yield.
- If the market price on 1-4-2002 is ₹ 950 then what is the YTM on that date.
- If the call price on 1-4-2002 is ₹ 1100 then what is yield to call on the date of issue.

Q8. ABC Ltd. issued 9%, 5 year bonds of ₹ 1,000/- each having a maturity of 3 years. The present rate of interest is 12% for one year tenure. It is expected that Forward rate of interest for one year tenure is going to fall by 75 basis points and further by 50 basis points for every next year in further for the same tenure. This bond has a beta value of 1.02 and is more popular in the market due to less credit risk.

Calculate:

- Intrinsic value of bond
- Expected price of bond in the market



4. DURATION AND MODIFIED DURATION

Duration is the period for which the bonds need to be held to recover the targeted cash flows from the bond. In other words it represents the time within which the bond repays the coupon and the principal to the investor. Duration of a coupon bearing bond is less than its life, while duration of a Zero Coupon Bond will always be equal to its life. This is also referred to as MacAulay Duration

Modified Duration is, as the name suggests, a modified version of MacAulay duration. Modified Duration measures the percentage change in bond prices (approximately) for every 100 basis points (1%) change in interest rates. In other words, it tells us, if interest rates move by 1%, how much will the bond price change by. Hence, Modified duration is a measure of volatility of the bond.

Modified duration = $\text{Duration} \times 1/(1+y/n)$ where y = yield and n = number of coupon payments in a year - e.g if the bond pays coupon annually then $n=1$, on the other hand if the bond pays coupon semi-annually then $n=2$.

A bond with a high modified duration indicates that the value of the bond will move significantly if there is any change in interest rates - hence when interest rates are expected to rise (i.e bond prices will fall) it would be prudent to avoid buying such bonds with high modified duration. However, if the interest rates are expected to fall (i.e Bond prices will increase) it would be preferable to buy such bonds with high duration.

PRACTICAL PROBLEMS**Q9.**

XL Ispat Ltd has made an issue of 14% non convertible debentures on January 1, 2007. These debentures have a face value of Rs. 100 and is currently traded in the market at a price of Rs. 90.

Interest on these NCDs will be paid through post dated cheques dated June 30th and December 31st . Interest payment for the first 3 years will be paid in advance through post dated cheques while for the last 2 years post dated cheques will be issued at the third year. The bond is redeemable at par on December 31st, 2011 at the end of 5 years.

Required:

- a. Estimate the current yield and the YTM of the bond.
- b. Calculate the duration of the NCD.
- c. Assuming that intermediate coupon payments are not available for reinvestment calculate the realised yield on the NCD.



5. IMMUNISATION OF PORTFOLIO

Bond immunization is an investment strategy used to minimize the interest rate risk of bond investments by adjusting the portfolio duration to match the investor's investment time horizon. It does this by locking in a fixed rate of return during the amount of time an investor plans to keep the investment without cashing it in.

Normally, interest rates affect bond prices inversely. When interest rates go up, bond prices go down. But when a bond portfolio is immunized, the investor receives a specific rate of return over a given time period regardless of what happens to interest rates during that time. In other words, the bond is "immune" to fluctuating interest rates.

To immunize a bond portfolio, you need to know the duration of the bonds in the portfolio and adjust the portfolio so that the portfolio's duration equals the investment time horizon. For example, suppose you need to have ₹ 50,000 in five years for your child's education. You might decide to invest in bonds. You can immunize your bond portfolio by selecting bonds that will equal exactly ₹ 50,000 in five years regardless of interest rate changes. You can buy one zero-coupon bond that will mature in five years to equal ₹ 50,000, or several coupon bonds each with a five year duration, or several bonds that "average" a five-year duration.

Logic of Bond Immunisation explained:

- a. Interest rate changes have opposite effects on a bond's price and reinvestment opportunities. While an increase in rates hurts a bond's price, it helps the bond's reinvestment rate.
- b. The goal of immunization is to offset these two changes to an investor's bond value, leaving its worth unchanged.
- c. A portfolio is immunized when its duration equals the investor's time horizon. At this point, any changes to interest rates will affect both price and reinvestment at the same rate, keeping the portfolio's rate of return the same.
- d. Maintaining an immunized portfolio means rebalancing the portfolio's average duration every time interest rates change, so that the average duration continues to equal the investor's time horizon.

PRACTICAL PROBLEMS

Q10. (NOV – 18 –NEW COURSE – 12 MARKS).

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%

- Calculate the duration of each bond.
- 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.
- 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?

- 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	t1	t2	t3	t4	t5
PVIF _{0.09,t}	0.917	0.842	0.772	0.708	0.650
Present Values	t6	t7	t8	t9	t10
PVIF _{0.09,t}	0.596	0.547	0.502	0.460	0.4224