

VALUATION AND PORTFOLIO MANAGEMENT

SOLUTIONS MID TERM (2023)

1. The following rates on a Rs.1,000 par value zero-coupon bonds are given Calculate the expected 1-year interest rate 2 year from now. Also calculate 2-year interest rate 3 years from now. 5 marks

Solution:

$$\begin{aligned} \text{a) } (1.0799)^3 &= (1.0750)^2(1+r) & \text{This gives } r &= 8.977\% \\ \text{b) } (1.1070)^5 &= (1.0799)^3(1+r)^2 & \text{This gives } r &= 14.893\% \end{aligned}$$

2.5 marks for each part done correctly.

Some students have rounded off the answers which is ok.

No marks for merely writing formulas or calculating some other interest rates

2. A 10-year maturity bond with 10% coupon rate (paid annually) sells at a YTM of 9%. A portfolio manager with a 3-year horizon needs to forecast the total return on the bond over a 3-year period. In three years, the bonds with 7-year maturity are expected to sell at a YTM of 8%. The coupons received from the bonds can be reinvested at 7%. What will be the annual rate of return that the portfolio manager can expect? 8 marks

Solution :

$$P_0 = 100 * PVIFA(9\%, 10) + 1000 * PVIF(9\%, 10) = 1064.175 \quad \text{2 marks}$$

$$P_3 = 100 * PVIFA(8\%, 7) + 1000 * PVIF(8\%, 7) = 1104.12 \quad \text{2 marks}$$

Value at t = 3 of dividends received

$$100(1.07)^2 + 100(1.07) + 100 = 321.49 \quad \text{1 mark}$$

Initial investment = 1064.175

$$\text{Final Value} = 1104.12 + 321.49 = 1425.617 \quad \text{1 mark}$$

Annual return

$$1064.175(1+r)^3 = 1425.617 \quad \text{1 mark}$$

$$\text{This gives } r = 10.23\% \quad \text{1 mark}$$

Many students have not calculated the dividend correctly and hence all subsequent calculations become incorrect.

3. A fund manager has to pay Rs.20 lacs in 2 years' time. He has options to invest in one year and three-year bonds. One-year bonds: Face Value Rs.1000/- Coupon 15%. Available at YTM of 20% Three-year bonds: Face Value Rs.1000/- Coupon 20%. YTM 20% The manager is considering investing a part of the amount in 1-year bonds and the balance in 3-year bonds. Using immunization technique determine how much amount should be invested in each types of bonds? Show how immunization technique accomplishes the desired result. Assume ending period YTM of 15%, 20% and 25%

Solution Qs3

Duration of 1 year bond =1

Duration of 3 year bond = 2.53

Calculation carries 2 marks

2 marks

$$W_1 + W_3 = 1$$

$$W_1 \times 1 + W_3 \times 2.53 = 2$$

Solving the above equations we get

$$W_1 = 0.35 \text{ \& } W_3 = 65\%$$

1 mark

$$\text{Money reqd to purchase bonds} = 2,000,000 / (1.20)^2 = \text{Rs.13.89 lacs}$$

1 mark

$$\text{Price of 1 year bond} = 1150 / 1.2 = 958.33$$

$$\text{Price of 3 year bond (coupon=ytm)} = 1000$$

1 mark

$$\text{No of one year bonds} = 507.3$$

$$\text{No of 3 year bonds} = 902.8$$

1 mark

Illustration 6 marks

	15%	20%	25%
Value at t = 2 from reinvesting one yr bond proceeds (1150 x 507.3 x (1 + y))	6,70,904	7,00,074	7,29,244
Value at t= 2 of three year bonds			
Value from reinvesting coupons recd at t = 1 200 x 902.8 x (1+y)	2,07,644	2,16,672	2,25,700
Coupons recd at t = 2 200 x 902.8	1,80,560	1,80,560	1,80,560
Selling price at t= 2 1200 x 902.8 / (1+y)	9,42,052	9,02,800	8,66,688
Aggregate value of the portfolio at t =2	20,01,160	20,00,106	20,02,192

Some answers may be different because of rounding off which is fine