

FIP- Assignment 2

(Roll. no. - 404)

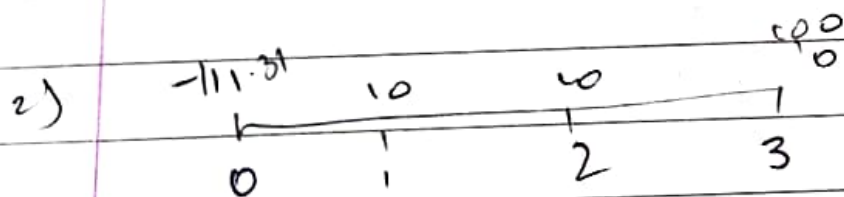
1) Coupon rate = 8%, par = 1000

$$\boxed{\text{Current yield} = \text{Bond value} \times (1 + \text{Semi-Annual rate})^n}$$

$$2) 1000 \times (1 + \frac{8\%}{2})^2$$

$$2) \text{TR } 1081.6$$

$$\frac{1081.6 - 1000}{1000} = \text{8.16\%}$$



$$-111.31 \times 10 \left[\frac{1 - (1 + 2\%)^{-3}}{2\%} \right] + \frac{1100}{(1 + 2\%)^3} = 0$$

$$n = 5.7856 \%$$

$$S_3 = 5.7856 \%$$

$$b) (1+S_2)^2 = (1+S_3)(1+1Y1Y)$$

$$(1.0398)^2 = (1.0299)(1+1Y1Y)$$

$$1Y1Y = \frac{1.0398^2 - 1}{1.0299}$$

$$1Y1Y = 4.7795\%$$

$$Q3) \text{ year 1} = 100(1+0.05)$$

$$\text{year 2} = 100(1.05)^2$$

$$\text{year 3} = 100(1.05)^3$$

$$\text{year 4} = 100(1.05)^4$$

$$YTM = 5\%$$

$$a) \begin{array}{ccccccc} & 105 & 110.25 & 115.7625 & 121.551 \\ | & | & | & | & | \\ 0 & 1 & 2 & 3 & 4 \end{array}$$

$$BV = \frac{100(1.05)}{(1.05)} + \frac{100(1.05)^2}{(1.05)^2} + \frac{100(1.05)^3}{(1.05)} + \frac{100(1.05)^4}{(1.05)^4}$$

$$PV = 400$$

$$b) \text{ Macaulay Duration} = \frac{\sum (PV \times t)}{\sum PV}$$

$$= \frac{100 \times 1 + 100 \times 2 + 100 \times 3 + 100 \times 4}{400}$$

$$= 2.5 \text{ years}$$

$$\text{Modified duration} = \frac{-MCD}{1 + YTM} = \frac{-2.5}{1 + 0.05}$$

$$= 2.38095 \text{ years}$$

$$Q9) T=1, C=6\%, FV=1000, y=6.5\%$$

$$PV \Rightarrow 1060 (1.065)^{-2} + \frac{60}{1.065} + 60$$

$$= 1050.896$$

$$\text{Horizon yield} = \frac{1050.896 - 1}{986.76}$$

$$= 7.999\% \approx 7.5\%$$

b) Purchase Price $\rightarrow$

$$60 \left(\frac{1 - (1.065)^{-3}}{0.065} \right) + 1000(1.065)^{-3}$$

$$= 986.76$$

$$\text{Total Inflow @ } T=1 \rightarrow 1000 + 60 = 1060$$

$$\text{Rate of Return} = \left(\frac{1060}{986.76} \right) - 1$$

$$= 7.4227\%$$

4) Ranking the investments from affected to least affected :-

B) ~~Zero~~ Zero coupon Treasury strips

C) 5.5% Treasury coupon

D) 9.25% Treasury bond

EA) Short term Treasury bills

Q6) The underwriter assumes the full risk of being unable to resell the bonds at stipulated offering price.

- The underwriter bears the risk of i.r. movement b/w the time of purchase & at resell
- Longer maturity bonds usually have a higher duration & they are exposed to more interest rate risk.
- Therefore underwriting fees for longer maturity bonds are higher as the risk is higher

Q8) A) $PV = 100$, $FV = 100$, $C = 6\%$, $i = 6\%$, $T = 10$

i) $i = 15\%$,

$$PV = 6 \left(\frac{1 - (1.15)^{-10}}{0.15} \right) + 100(1.15)^{-10}$$

$$= 54.86 \quad 54.83$$

b) $i = 16\%$,

$$PV = 6 \left(\frac{1 - (1.16)^{-10}}{0.16} \right) + 100(1.16)^{-10}$$

$$PV = 51.667$$

$$\% \text{ change} = \frac{1 - 51.6677}{54.83}$$

$$= 5.7674\%$$

c) $i = 5\%$

$$PV = 6 \left(\frac{1 - (1.05)^{-10}}{0.05} \right) + 100 (1.05)^{-10}$$

$$= 107.7217$$

d) $i = 6\%$, $PV = 100$, $i = c$

$$\text{change} \Rightarrow \frac{1 - 100}{107.7217}$$

$$= 7.1682\%$$

e) Price volatility is higher at lower interest rates due to convex nature of price yield curve

Q9) ~~24~~ = 400

$$\text{Total return} \rightarrow 100(1+i)^5 = 150.5357$$

$$i = 8.525\%$$

Q10)

Bond	Mt	Duration
W	13	2
X	27	7
Y	60	8
Z	40	14
	<u>140</u>	

i)

$$\text{Duration of bond} = \sum wq \cdot x \text{ duration}$$

$$= \frac{13}{140} \times 2 + \frac{27}{140} \times 7 + \frac{60}{140} \times 8 + \frac{40}{140} \times 14$$

$$= 8.964$$

ii)

$$8.964 \times (0.005) \times 140$$

$$= \frac{6.2748}{140} \times 100$$

$$= 4.482\%$$

$$\text{iii) } W = \frac{0.13 \times 13}{140} = 0.12371$$

$$X = \frac{7 \times 27}{140} = 1.35$$

$$Y = \frac{8 \times \frac{60}{7}}{140} = 3.4286$$

$$Z = \frac{14 \times 40}{140} = 4$$

Q.3) 2 Portfolios can have same duration & their convexities may differ so that even for a parallel shift in yield curve, the % change in price may differ.

For non parallel shift in the yield curve, portfolios of differing convexity may perform very differently even if they have the same duration.

Q11) The price responsiveness of a zero coupon bond is diff. as yields change. ZCB have $>$ price responsiveness for change at higher lvl of maturity as interest rates change.
ZCB $>$ price responsiveness for changes at lower lvl of interest rates compared to higher lvl of interest rates.

Expect for long maturity deep discount bonds
Bond with lower coupon rate will have greater modified and Macaulay durations.
For given yield and maturity, zero coupon bond have higher convexity and thus greater price responsiveness to change in yield.