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FIP Assignment

2. a) $$r_1 = \frac{110}{106.8} - 1 = 3\%$$

$$109.93 = \frac{5}{1+r_1} + \frac{105}{(1+r_2)^2} \Rightarrow r_2 = 4\%$$

$$111.31 = \frac{10}{1+r_1} + \frac{10}{(1+r_2)^2} + \frac{110}{(1+r_3)^2} \Rightarrow r_3 = 6\%$$

b) $$f_2 = \frac{(1+r_2)^2}{1+r_1} - 1 = 5\%$$

3. a) Price = Present Value of cash flows $= 100 \times \frac{(1+r)}{(1+r)} + 100 \times \frac{(1+r)^2}{(1+r)^2}$

$$+ 100 \times \frac{(1+r)^3}{(1+r)^3} + \dots = 400$$

b) Duration $= \frac{1+2+3+4}{4} = 2.5$ years

1. The effective yield on the semi annual coupon bonds is 8.16%. If the annual coupon bonds are to sell at par, they must offer the same yield which will require ann coup of 8.16%

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4.

b) The entire value of the treasury strip is in the principal repayment in the distant future; it has the highest duration and is most sensitive to a change in the interest rate.

c) despite having the same maturity as (b) (c) has 5.5% coupon payments that dampen its sensitivity to interest rate changes.

d) higher coupon payment → lower duration.

a) T- bills are only for 1 to 6 months they have small duration

5. a) The current price of the bond is

$$P_0 = \frac{60}{1.065} + \frac{60}{1.065^2} + \frac{1060}{1.065^3}$$

$$= \$986.76$$

Sell it one year for.

$$P_1 = \frac{60}{1.065} + \frac{1060}{1.065^2} = \$990.90$$

b) The bond now has the same coupon rate as the yield to maturity so it is trading at par.

So new price $P_1 = \$1000$.

$$\text{Rate of return} = \frac{1000 + 60}{986.76} - 1$$

$$= 7.4\%$$

6. If the underwriter purchases the bonds from the corporate client then it assumes the full risk of being unable to resell the bonds at the stipulated offering price. In other words the underwriter bears the risk of ~~being~~ interest rate movement between the time of purchase and the time of resale.

The Underwriter demands a larger spread between the purchase price & stipulated offering price

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8. a) We have a 10-year 6% coupon bond with a par value of \$1000 and a required yield of 15%.

Given $C = 0.06(\$1000)/2 = \$30$,
$n = 2(10) = 20$
$r = 0.15/2 = 0.075$

$$P = C\left[\frac{1 - \frac{1}{(1+r)^n}}{r}\right] =$$

$$\$30\left[\frac{1 - \frac{1}{1.075^{20}}}{0.075}\right] = \$305.84$$

The present value of the par or maturity value of \$1000 is

$$\frac{M}{(1+r)^n} = \frac{\$1000}{(1.075)^{20}} = 235.42.$$

Price of bond $= 305.84 + 235.42$
$= 541.26$ //

b) If the required yield increases from 15% to 16%

$$P = \$30 \left[\frac{1 - \frac{1}{1.08^{20}}}{0.08} \right]$$

$$= \$294.544.$$

The present value of the par or maturity value of \$1000 is

$$\frac{1000}{1.08^{20}} = \$214.548.$$

Thus price of bond is $\$294.544 + \$214.548$

$$= \$509.09.$$

c) If the required yield is 5%. Then we have

$$P = \$30 \left[\frac{1 - \frac{1}{1.025^{20}}}{0.025} \right] = \$467.675$$

Present value of par value is

$$\frac{1000}{(1.025)^{20}} = \$610.271$$

Price of bond = $467.675 + $610.271
= $1077.95

9. The total coupon payments plus the interest on interest, assuming an annual reinvestment rate of 9.4% or 4.7% every six months.

The coupon payments are $45 every six months for five years or ten periods

The total coupon interest plus interest on interest is

$$= \$45\left[\frac{(1.047)^{10}-1}{0.047}\right]$$

$$= \$558.14$$

The projected sale price at the end of five years assuming that the required yield to maturity for two year bonds is 11.2% is accomplished by calculating the present value of four coupon payments of $45

$$= 945\left[\frac{1-\frac{1}{(1.056)^4}}{0.056}\right] + \left[\frac{\$1000}{(1.056)^4}\right]$$

$= \$961.53$

10. For zero coupon bonds none of the bond's total dollar return is dependent on the interest on interest component so a zero coupon bond has zero reinvestment risk if held to maturity.

The yield earned on a zero coupon bond held to maturity.

The yield earned on a zero coupon bond held to maturity is equal to the promised YTM.

This is because whenever one can reinvest the coupon payments at the YTM, total return will be the same as yield to maturity.

Total return = 8%

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12.

The Macaulay duration is equal to modified duration times one plus the yield.

$$\text{Modified dur} = \frac{\text{Macaulay Dur}}{1+y}$$

13.

If the two bonds have the same dollar duration then their percentage change in price is the same.

This implies they will have the same dollar price sensitivity.

This possibility is seen from the following equation:

$$\frac{dP}{dy} = -(\text{modified duration})\,P$$

where the expression on the right hand side is the estimated dollar duration.