Reading 58
INTEREST RATE RISK & RETURN

1. (B) higher than the YTM at the date of purchase.

Explanation

If the investment horizon is shorter than the Macaulay duration, the price impact of a decrease in YTM dominates the loss of reinvestment income and the realized yield will be higher than the YTM at purchase.

(Module 58.1, LOS 58.b)

2. (A) approximately 4.5%.

Explanation

With Macaulay duration equal to the investment horizon, market price risk and reinvestment risk approximately offset and the annualized horizon return should be close to the yield to maturity at purchase.

(Module 58.1, LOS 58.b)

3. (A) A shorter maturity.

Explanation

Other things being equal, the amount of reinvestment risk embedded in a bond will decrease with lower coupons as there are fewer coupons to reinvest and with shorter maturities because the reinvestment period is shorter. A lower Macaulay duration may reflect more or less reinvestment risk, depending on what causes Macaulay duration to be lower. A lower Macaulay duration could result from a shorter maturity (which reduces reinvestment risk) or a higher coupon (which increases reinvestment risk).

(Module 58.1, LOS 58.a)

4. (B) greater than 7.0% on the Kano bonds and less than 8.0% on the Samuel bonds.

Explanation

The yield to maturity calculation assumes that all interim cash flows are reinvested at the yield to maturity (YTM). Since Horn's reinvestment rate is 7.5%, he would realize a return higher than the 7.0% YTM of the Kano bonds, or a return less than the 8.0% YTM of the Samuel bonds.

(Module 58.1, LOS 58.a)

5. (B) 7.515%.

Explanation

The reinvestment assumption that is embedded in any present value-based yield measure implies that all coupons and principal payments must be reinvested at the specific rate of return, in this case, the yield to maturity. Thus, to obtain a 7.515% total dollar return, the investor must reinvest all the coupons at a 7.515% rate of return. Total dollar return is made up of three sources, coupons, principal, and reinvestment income.

(Module 58.1, LOS 58.a)

6. (C) may be greater or less than the realized yield.

Explanation

For the realized yield to equal the YTM, coupon reinvestments must occur at that YTM. Whether reinvesting the coupons at the coupon rate will result in a realized yield higher or lower than the YTM depends on whether the bond is at a discount (coupon < YTM) or a premium (coupon > YTM).

(Module 58.1, LOS 58.a)

7. (B) Yes, because the bond's yield to maturity may have changed.

Explanation

Prior to maturity, a zero-coupon bond's price may be different than its constant-yield price trajectory and the bondholder may realize a capital gain or loss by selling the bond. For a zero-coupon bond that is held to maturity, the increase from the purchase price to face value at maturity is interest income.

(Module 58.1, LOS 58.a)

8. (B) Macaulay duration.

Explanation

Macaulay duration is the investment horizon at which reinvestment risk and market price risk approximately offset each other.

(Module 58.1, LOS 58.b)

9. (B) greater than price risk and the realized yield will be lower than the YTM at purchase.

Explanation

If the bond is held to maturity, the investor will receive all coupons and principal and reinvest them at a lower return than the YTM at purchase, resulting in a lower realized yield.

(Module 58.1, LOS 58.a)

10. (C) 6.15

Explanation

Duration is a measure of a bond's sensitivity to changes in interest rates.

Modified duration = $(V_- – V_+) / [2V_0$(change in required yield)] where:

V_- = estimated price if yield decreases by a given amount

V_+ = estimated price if yield increases by a given amount

V_0 = initial observed bond price

Thus, modified duration = (103.14 − 96.99) / (2 × 100 × 0.005) = 6.15. Remember that the change in interest rates must be in decimal form.

(Module 58.1, LOS 58.a)

11. (A) carrying value.

Explanation

Capital gains and losses on bonds purchased at a discount or premium are measured relative to carrying value (original price plus amortized discount or minus amortized premium) from the constant-yield price trajectory, not from the purchase price.

(Module 58.1, LOS 58.a)

12. (A) approximate percentage change in a bond's value for a 1% change in its yield to maturity.

Explanation

Modified duration is the approximate percentage change in a bond's value for a 1% change in its YTM. Macaulay duration is the weighted average number of periods until a bond's cash flows are scheduled to be paid and represents the investment horizon at which a bond's market price risk and reinvestment risk exactly offset.

(Module 58.1, LOS 58.c)

13. (C) 5.75 years.

Explanation

Concern about rising rates and price risks occurs when there is a positive duration gap where the Macaulay duration exceeds the investor's investment horizon. If the investment horizon is 5.25 years, the Macaulay duration must be higher. The only Macaulay duration that is greater is 5.75 years.

(Module 58.1, LOS 58.c)

14. (B) duration gap is positive.

Explanation

Price risk will dominate reinvestment risk when the investor's investment horizon is less than the bond's Macaulay duration (i.e., when the duration gap is positive).

(Module 58.1, LOS 58.b)

15. (C) $ 574.

Explanation

$935(1.035)^{30} = \$2,624$

Bond coupons: $30 \times 35 = \$1,050$

Principal repayment: $1,000

$2,624 - 1,000 - 1050 = \$574$ required reinvestment income

(Module 58.1, LOS 58.a)

16. (C) reinvestment risk due to decreasing interest rates.

Explanation

When the investment horizon exceeds the Macaulay duration (as it does here), there is a negative duration gap that exposes the investors to reinvestment risk; this risk occurs when the cash flows received from an investment must be subsequently invested in a lower interest rate environment. Price risk due to increasing interest rates is a risk when there is a positive duration gap (Macaulay duration exceeds investment horizon). Even though the horizon and duration are within 0.5 years, the risk is not minimal, especially given that 0.5 years is an eighth of the total investment horizon. In another scenario, you might conclude that a duration gap of 0.5 years is relatively close if the investment horizon was much longer.

(Module 58.1, LOS 58.c)

17. (A) 3.67 years.

Explanation

The calculation to derive the Macaulay duration is shown here:

Cash Flow	Present Value	Weighting
6	6 / 1.07 = 5.6075	5.6075 / 96.6128 = 0.0580
6	$6 / 1.07^2 = 5.2406$	5.2406 / 96.6128 = 0.0542
6	$6 / 1.07^3 = 4.8978$	4.8978 / 96.6128 = 0.0507
106	$106 / 1.07^4 = 80.8669$	80.8669 / 96.6128 = 0.8370
	Total present value = 96.6128	

Macaulay duration = 0.0580 (1) + 0.0542 (2) + 0.0507 (3) + 0.8370 (4) = 3.67 years.

(Module 58.1, LOS 58.c)

18. (C) assigned greater value for earlier cash flows.

Explanation

In the Macaulay duration calculation, once the proportion of total PV for each individual PV are determined, they are each multiplied by the length of time until they are received. So, for example, in an annual pay bond calculation, the weighting for the Year 1 cash flow is multiplied by 1, the weighting for the Year 2 cash flow is multiplied by 2, and so on. The highest value is assigned to the last cash flow received—which, in a coupon-paying bond, is typically the final interest payment and the principal payment.

(Module 58.1, LOS 58.c)

19. (A) has a negative duration gap.

Explanation

A duration gap is a difference between a bond's Macaulay duration and the bondholder's investment horizon. If Macaulay duration is less than the investment horizon, the bondholder is said to have a negative duration gap and is more exposed to downside risk from decreasing interest rates (reinvestment risk) than from increasing interest rates (market price risk).

(Module 58.1, LOS 58.b)

20. (B) incorrect, because these are not the only sources of return from investing in a bond.

Explanation

The advisor's description of the sources of return from investing in a bond is incomplete because it does not include the income from reinvesting the bond's coupon payments. Although it is true that an investor who holds a bond to maturity will not realize a capital gain or loss, this is not why the advisor's statement is incorrect.

(Module 58.1, LOS 58.a)

21. (B) the average time until the receipt of the bond's cash flows.

Explanation

The Macaulay duration is the average time until the receipt of the cash flows of the bond. The investor will recover his principal (in a typical scenario) at the end of the bond's life, when it matures (here, that is three years). Duration is a measure of bond price sensitivity to interest rate changes, but that is not the interpretation of the Macaulay duration specifically.

(Module 58.1, LOS 58.c