

## Question #1 of 21

Question ID: 1574320

An investor purchases a fixed coupon bond with a Macaulay duration of 5.3. The bond's yield to maturity decreases before the first coupon payment. If the YTM then remains constant and the investor sells the bond after three years, the realized yield will be:

- A) equal to the YTM at the date of purchase. 
- B) higher than the YTM at the date of purchase. 
- C) lower 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)

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## Question #2 of 21

Question ID: 1574318

An investor buys a bond that has a Macaulay duration of 3.0 and a yield to maturity of 4.5%. The investor plans to sell the bond after three years. If the yield curve has a parallel downward shift of 100 basis points immediately after the investor buys the bond, her annualized horizon return is *most likely* to be:

- A) approximately 4.5%. 
- B) greater than 4.5%. 
- C) less than 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)

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### Question #3 of 21

Question ID: 1574309

All else being equal, which of the following bond characteristics *most likely* results in less reinvestment risk?

- A) A shorter maturity. 
- B) A higher coupon. 
- C) A lower Macaulay duration. 

#### 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)

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### Question #4 of 21

Question ID: 1574312

Tony Horn, CFA, is evaluating two bonds. The first bond, issued by Kano Corp., pays a 7.5% annual coupon and is priced to yield 7.0%. The second bond, issued by Samuel Corp., pays a 7.0% annual coupon and is priced to yield 8.0%. Both bonds mature in ten years. If Horn can reinvest the annual coupon payments from either bond at 7.5%, and holds both bonds to maturity, his return will be:

- A) greater than 7.0% on the Kano bonds and greater than 8.0% on the Samuel bonds. 
- B) greater than 7.0% on the Kano bonds and less than 8.0% on the Samuel bonds. 
- C) less 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)

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**Question #5 of 21**

Question ID: 1574308

An investor purchases a 4-year, 6%, semiannual-pay Treasury note for \$9,485. The security has a par value of \$10,000. To realize a total return equal to 7.515% (its yield to maturity), all payments must be reinvested at a return of:

- A) more than 7.515%. 
- B) 7.515%. 
- C) less than 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)

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**Question #6 of 21**

Question ID: 1574310

If the coupon payments are reinvested at the coupon rate during the life of a bond, then the yield to maturity:

- A) is greater than the realized yield. 
- B) is less than the realized yield. 
- 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)

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## Question #7 of 21

Question ID: 1574313

Assuming the issuer does not default, can capital gains or losses be a component of the holding period return on a zero-coupon bond that is sold prior to maturity?

- A) No, because amortization of the discount is interest income. 
- B) Yes, because the bond's yield to maturity may have changed. 
- C) Yes, because the purchase price is less than the bond's value at maturity. 

### 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)

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## Question #8 of 21

Question ID: 1574317

Which measure of duration should be matched to the bondholder's investment horizon so that reinvestment risk and market price risk offset each other?

- A) Effective duration. 
- B) Macaulay duration. 
- C) Modified 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)

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## Question #9 of 21

Question ID: 1574311

If the yield to maturity on a bond decreases after purchase but before the first coupon date and the bond is held to maturity, reinvestment risk is:

- A) less than price risk and the realized yield will be lower than the YTM at purchase. 
- B) greater than price risk and the realized yield will be lower than the YTM at purchase. 
- C) less than price risk and the realized yield will be higher 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)

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### Question #10 of 21

Question ID: 1574316

An international bond investor has gathered the following information on a 10-year, annual-pay U.S. corporate bond:

- Currently trading at par value
- Annual coupon of 10%
- Estimated price if rates increase 50 basis points is 96.99%
- Estimated price if rates decrease 50 basis points is 103.14%

The bond's modified duration is *closest* to:

- A) 3.14. 
- B) 6.15. 
- C) 6.58. 

### Explanation

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

Modified duration =  $(V_- - V_+) / [2V_0(\text{change in required yield})]$  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 =  $(103.14 - 96.99) / (2 \times 100 \times 0.005) = 6.15$ . Remember that the change in interest rates must be in decimal form.

(Module 58.1, LOS 58.a)

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### Question #11 of 21

Question ID: 1574314

Sarah Metz buys a 10-year bond at a price below par. Three years later, she sells the bond. Her capital gain or loss is measured by comparing the price she received for the bond to its:

- A) carrying value. 
- B) original price less amortized discount. 
- C) original purchase price. 

#### 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)

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### Question #12 of 21

Question ID: 1577194

Annual Macaulay duration is *least accurately* interpreted as the:

- A) approximate percentage change in a bond's value for a 1% change in its yield to maturity. 
- B) investment horizon at which a bond's market price risk and reinvestment risk exactly offset. 

- C) weighted average number of years until a bond's cash flows are scheduled to be paid. 

### 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)

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### Question #13 of 21

Question ID: 1576056

An investor is concerned about rising interest rates and associated price risks. If her investment horizon is 5.25 years, the Macaulay duration on her bond investment is likely *closest* to:

- A) 5.25 years. 
- B) 4.75 years. 
- 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)

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### Question #14 of 21

Question ID: 1574321

Price risk will dominate reinvestment risk when the investor's:

- A) duration gap is negative. 
- B) duration gap is positive. 
- C) investment horizon is less than the bond's tenor. 

### 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)

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### Question #15 of 21

Question ID: 1574307

Jane Walker has set a 7% yield as the goal for the bond portion of her portfolio. To achieve this goal, she has purchased a 7%, 15-year corporate bond at a discount price of 93.50. What amount of reinvestment income will she need to earn over this 15-year period to achieve a compound return of 7% on a semiannual basis?

- A) \$459. 
- B) \$624. 
- C) \$574. 

#### Explanation

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

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

Principal repayment: \$1,000

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

(Module 58.1, LOS 58.a)

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### Question #16 of 21

Question ID: 1576055

An investor has an investment horizon of 4 years, and a Macaulay duration for one of her million-dollar bond investments of 3.5 years. The investor's exposure to interest rates is *best* reflected as:

- A) price risk due to increasing interest rates. 
- B) minimal, due to the relatively close duration and horizon. 
- 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)

### Question #17 of 21

Question ID: 1576057

The Macaulay duration in years of a 4-year annual pay, 6% coupon bond with a par value of \$100 and yielding 7% is *closest* to:

- A) 3.67 years. 
- B) 3.99 years. 
- C) 3.35 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)

### Question #18 of 21

Question ID: 1576058

In a Macaulay duration calculation, the weights calculated for each future cash flow are:

- A) assigned greater value for later cash flows. 

**B)** valued equally. 

**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)

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### Question #19 of 21

Question ID: 1574319

An investor who buys bonds that have a Macaulay duration less than his investment horizon:

**A)** has a negative duration gap. 

**B)** is minimizing reinvestment risk. 

**C)** will benefit from decreasing interest rates. 

### 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)

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### Question #20 of 21

Question ID: 1574315

An investment advisor states, "An investor's annualized holding period return from investing in a bond consists of three parts: the coupon interest payments, the return of principal, and any capital gain or loss that the investor realizes on the bond." The advisor is:

**A)** correct. 

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

- C) incorrect, because an investor who holds a bond to maturity will not realize a capital gain or loss. 

### 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)

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### Question #21 of 21

Question ID: 1576054

An analyst has calculated a Macaulay duration of 2.12 for a three-year corporate bond. For this bond, 2.12 represents:

- A) the sensitivity of the bond's price to changes in interest rates. 
- B) the average time until the receipt of the bond's cash flows. 
- C) when the investor recovers his principal. 

### 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)