Learning Module 11: Yield Based Bond Duration Measures and Properties

Q.87 The price value of a basis point (PVBP) is a measure of:

    A. The change in price given a 1 basis point change in the YTM.

    B. The percentage change in price given a 1% change in the YTM.

    C. The percentage change in price given a 1 basis point change in the YTM.

The correct answer is **A.**

The price value of a basis point (PVBP) is another version of money duration. a measure of the change in price given a 1 basis point change in the YTM. It is calculated as:

$$PVBP = \frac{(PV_-) - (PV_+)}{2}$$

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP)

Q.89 Compared to a non-callable and non-puttable bond, the interest rate sensitivity of:

A. Callable bonds is lower and putable bonds is lower.

B. Callable bonds is higher and putable bonds is lower.

C. Callable bonds is higher and putable bonds is higher.

The correct answer is **A.**

Interest rate sensitivity of callable and puttable bonds is lower. Callable and putable bonds are bonds with embedded options. All else being held equal, bonds with embedded options have a low sensitivity to interest rate changes. The price of a callable (putable) bond is lower(higher) than that of a non-callable (non-putable) bond by an amount equal to the embedded option. As interest rates rise (fall for putable bonds), the price of the embedded call(put) option declines (increases), thereby decreasing the overall price decline (increase for putable bonds), hence lowering interest rate sensitivity.

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP).

Q.964 Which of the following *most likely* depicts the percentage price change for a bond given a change in its yield-to-maturity?

A. Effective duration.

B. Modified Duration.

C. Macaulay Duration.

The correct answer is **B.**

Modified duration is calculated by dividing the Macaulay duration by (1 + yield to maturity), thereby indicating the percentage change in price due to a change in yields.

A is incorrect. Effective duration measures the sensitivity of a bond's price to a change in a benchmark yield curve.

C is incorrect. Macaulay duration computes the approximate amount of time a bond would have to be held for the market discount rate at purchase to be realized if there is a single change in interest rate.

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP)

Q.965 You have been provided the following information on a bond:

Period	Cash Flow (USD Mn)
1	3.7
2	4.9
3	107

If the yield to maturity is 6%, and it is currently trading at $95, the modified duration of the bond is *closest to*:

   A. 2.45 years.

   B. 2.60 years.

   C. 2.79 years.

The correct answer is **C.**

To calculate the modified duration of a bond, we first need to determine its Macaulay duration and then adjust it for the bond's yield to maturity (YTM). The Macaulay duration is the weighted average time until the bond's cash flows are received, and it is calculated using the present value of each cash flow.

$$\text{Macaulay Duration} = \frac{[1 \times \frac{3.7}{(1.06)^1}] + [2 \times \frac{4.9}{(1.06)^2}] + [3 \times \frac{107}{(1.06)^3}]}{95} = \frac{281.73}{95} = 2.96 \text{ years}$$

Recall that:

$$\text{Modified Duration} = \frac{\text{Macaulay Duration}}{(1 + \text{YTM})} = \frac{2.96}{1.06} = 2.79 \text{ years}$$

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP)

Q.966 If Modified Duration $= \frac{\text{Macaulay Duration}}{(1+\text{Yield})}$, The value of the Approximate Modified Duration is closest to?

    A. $\frac{\text{Approximate Macaulay Duration}}{(1+\text{Yield})}$.

    B. Approximate Macaulay Duration $\times$ (1 + Yield).

    C. $\frac{\text{Approximate Macaulay Duration} \times (1-\text{Yield})}{(1+\text{Yield})}$.

The correct answer is **A.**

Just like the Modified Duration, the Approximate Modified Duration is calculated by dividing the Approximate Macaulay Duration by (1 + Yield).The approximate modified duration formula is:

$$\text{ApproxModDur} = \frac{\text{ApproxMacDur}}{(1+r)}$$

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP)

Q.973 The concept of duration *most likely* helps to understand the relationship between which of the following?

    A. Full price and interest rates.

    B. Full price and maturity period.

    C. Interest rate and maturity period.

The correct answer is **A.**

The concept of duration helps to understand the sensitivity of a bond's full price to a change in interest rates.

A bond's full price is the security of a bond with accrued interest. It is also called the invoice or dirty price.

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP)

Q.2030 The return impact or percentage change in bond prices for smaller spread changes can be approximated by:

      A. Return impact = -(Modified duration) * Δspread.

      B. Return impact = -(Modified duration) * Δspread + 1/2*Convexity x (Δspread)^2.

      C. Return impact = Modified duration * Δspread.

The correct answer is **A.**

For smaller spread changes, Return impact = - (Modified duration) * Δspread
Option B) is incorrect because it is for larger spread changes that Return impact = -(Modified duration) * Δspread + 1/2*Convexity x (Δspread)^2.Larger spreads need a convexity adjustment because duration alone may not accurately estimate price changes due to the convex nature of the yield curve. ***CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP)***

Q.2146 In response to a 0.1% increase in YTM and a Modified Duration of 3.567, the price of the bond should:

      A. Fall by approximately 0.3567%.

      B. Fall by approximately 3.567%.

      C. Rise by approximately 3.567%.

The correct answer is **A.**

$$\text{Approximate percentage change in bond price} = -(\text{ModDur}) \times YTM.$$

$$\text{Percentage change in bond price} = -3.567 \times 0.1 \Rightarrow \text{ Fall in price by approx 0.3567\%}$$

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP)

Q.2147 For a 10-year, 5% annual-pay bond with a face value of $1,000, currently trading at par, the approximate modified duration based on a change in yield of 25 basis points is *closest to:*

    A. 3.9.

    B. 7.8.

    C. 15.6.

The correct answer is **B.**

The price of the bond at a yield of 5% + 0.25% is:

$$N = 10; I/Y = 5.25; FV = 1,000; PMT = 50; CPT \Rightarrow PV = -981$$

The price of the bond at a yield of 5% - 0.25% is:

$$N = 10; I/Y = 4.75\%; FV = 1,000; PMT = 50; CPT \Rightarrow PV = -1020.$$

$$\text{Approximate Modified Duration} = \frac{PV\_PV_+}{2 \times \Delta \text{Yield} \times PV_0}$$

where PV_- is the price of the bond when yield decreases, PV_+ is the price of the bond when yield increases, and PV_0 is the base price before an increase/decrease in yield.

$$\text{The approximate modified duration} = \frac{(1,020 - 981)}{(2 \times 1000 \times 0.0025)} = 7.8$$

Therefore, the approximate change in price for a 1% change in YTM is 7.8%.

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP)

Q.2149 While calculating duration, for which of the following bonds would an investor *most likely* use Modified Duration rather than Effective Duration?

    A. A callable bond.

    B. A convertible bond.

    C. An option-free bond.

The correct answer is **C.**

Effective duration considers a change in the benchmark yield curve, whereas modified duration considers a change in the yield to maturity of a bond. Bonds with embedded options lack a clearly defined Yield to Maturity, disqualifying yield-related statistics like Modified and Macaulay durations from being used to estimate the change. Embedded options are Contingency provisions that provide the issuer or the bondholders the right, but not the obligation, to take action. These options are not part of the security and cannot be traded separately. Examples of embedded options include callable, putable, and convertible securities.

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP)

Q.2150 Which of the following statement is/are *most likely* incorrect?

     A. A bond or portfolio will have a key rate duration for each maturity range on the spot rate curve.

     B. The duration of a bond measures the sensitivity of the bond's full price to changes in the bond's coupon rate.

     C. The sensitivity of bonds to changes in the shape of the benchmark yield curve is measured by using partial duration.

The correct answer is **B.**

The duration of a bond measures the sensitivity of the bond's full price (including accrued interest) to changes in the bond's yield-to-maturity and not coupon rate.

A is incorrect. The sensitivity of bonds to changes in the shape of the benchmark yield curve is measured by using partial duration or key rate duration.

C is incorrect. A bond or portfolio will have a key rate duration for each maturity change on the spot rate curve.

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP)

Q.2153 A \$5 million par value bond has a modified duration of 7.42 and a full price of 101.32, expressed per \$100 of face value. Its money duration per \$100 of face value is *closest to*:

    A. \$752.

    B. \$371,000.

    C. \$37,589,720.

The correct answer is **A.**

$$\text{Money duration} = \text{Modified duration} \times \text{Full value of the bond}$$

$$\text{Money duration per \$100 of par value} = 7.42 \times 101.32 = \$751.79$$

Note: If the question had not asked for the money duration per \$100 of par value, the answer would then be:

$$\text{Money duration} = 7.42 \times \$5,000,000 \times 1.0132 = \$37,589,720$$

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP)

Q.3879 The duration of a pure discount bond is equal to its time to maturity. Its price is:

    A. Not affected by changes in interest rates.

    B. Greatly affected by changes in interest rates.

    C. Minimally affected by changes in interest rates.

The correct answer is **B.**

Pure discount bonds also known as zero-coupon bonds are Bonds that do not pay interest during the bond's life. It is issued at a discount to par value and redeemed at par. Because a zero-coupon bond's only cash-flow is at maturity, its price is greatly affected by changes in interest rates.

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (b): Explain how a bond's maturity, coupon, and yield level affect its interest rate risk.

Q.3892 An investor holds a $5 million (par value) in a 4.5% bond maturing on March 31, 2020. The bond is currently priced at 97.250 per 100 of par value to yield 5.250% on an annual basis for settlement on 30 June 2019. The total market value including accrued interest is $4,980,000. If the bond's annual Macaulay duration is 2.500, then its dollar duration is *closest to:*

    A. 231.

    B. 237.

    C. 462.

The correct answer is **A.**

Dollar duration is the name given to money duration in the United States.

$$
\begin{aligned}
\text{MoneyDur} &= \text{AnnModDur} \times \text{PV}^{\text{Full}} \\
&= \frac{\text{MacDur}}{1+y} \times \text{PV}^{\text{Full}} \\
&= \frac{2.5}{1+0.0525} \times \$97.250 \approx \$231
\end{aligned}
$$

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP)

Q.4884 If all other characteristics of a bond are held constant, what is the *most likely* effect of an increase in the bond's yield-to-maturity on its modified duration?

  A. The bond's modified duration will increase.

  B. The bond's modified duration will decrease.

  C. The bond's modified duration will remain unchanged.

The correct answer is **B.**

When the yield-to-maturity (YTM) of a bond increases, the present value of the bond's future cash flows decreases, leading to a shorter weighted average time until those cash flows are received. This results in a decrease in the bond's modified duration, as the bond's price becomes less sensitive to changes in YTM.

A is incorrect: An increase in yield-to-maturity decreases the present value of future cash flows and shortens the duration. Therefore, the modified duration decreases, not increases, as the bond's price sensitivity to interest rate changes diminishes with higher yields.

C is incorrect: If the YTM increases, modified duration will not remain unchanged.

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP)

Q.4885 If two bonds are identical in all other respects (e.g., time-to-maturity, yield, etc.), which of the following statements about their modified durations is true?

A. The bond with the lower coupon rate will have a higher modified duration.

B. The bond with the higher coupon rate will have a higher modified duration.

C. Both bonds will have the same modified duration.

The correct answer is **A.**

When two bonds are identical except for their coupon rates, the bond with the lower coupon rate will have the higher modified duration. This is because the present value of the cash flows from the lower coupon rate bond constitutes a smaller portion of its total price, making its price more sensitive to changes in yield.

B is incorrect: A higher coupon rate bond will have a lower modified duration because the present value of its cash flows is a larger portion of the total price, making it less sensitive to changes in yield compared to a lower coupon rate bond.

C is incorrect: Coupon rates directly affect the bond's modified duration, so bonds with different coupon rates will not have the same modified duration, even if all other characteristics are identical.

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP)

Q.4886 Daniel is analyzing a 5% semiannual coupon bond issued by XYZ Corporation. The bond has an annualized Macaulay duration of 4.250 years. XYZ Corporation has recently faced financial difficulties, leading to an increase in the bond's yield from 6% to 7%. Daniel wants to determine the anticipated percentage change in the bond's full price due to this yield increase. The anticipated percentage change in the bond's full price is *closest to*:

    A. –3.920%

    B. –4.126%

    C. –4.157%

The correct answer is **B.**

To calculate the anticipated percentage change in the bond's full price using Macaulay duration, we use the formula:

$$\%\Delta PV^{Full} \approx -AnnModDur \times \Delta AnnYield$$

First, convert the Macaulay duration to the modified duration using the formula:

$$ModDur = \frac{MacDur}{(1 + r)}$$

So, we calculate the modified duration as:

$$ModDur = \frac{4.250}{1 + (\frac{0.06}{2})} = \frac{4.250}{1 + 0.03} = \frac{4.250}{1.03} \approx 4.126 \text{ years}$$

Next, calculate the percentage annual change in yield (ΔAnnYield):

$$\Delta AnnYield = 7\% - 6\% = 1\% = 0.01$$

Now, use the modified duration to find the anticipated percentage change in the bond's price:

$$\%\Delta PV^{Full} = -4.126 \times 0.01 \approx -0.04126 \approx -4.126\%$$

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP)

Q.4887 Which of the following statements best describes the use of duration measures in bond yields? Duration measures the:

   A. expected change in a bond's price for a given change in credit rating.

   B. average time it takes to receive all the cash flows from a bond.

   C. sensitivity of bond prices to changes in yields, estimating the percentage price change for a given change in interest rates.

The correct answer is **C.**

Duration is used to estimate how much the price of a bond will change in response to a change in interest rates or yields. It provides a measure of the bond's sensitivity to yield changes.

A is incorrect. It incorrectly associates duration with changes in credit ratings. Duration does not measure the impact of credit rating changes on bond prices; instead, it measures the sensitivity of bond prices to changes in interest rates or yields.

B is incorrect. It describes the Macaulay duration, which is the weighted average time to receive the bond's cash flows. While Macaulay duration is related to the concept of duration, it is not the primary measure used to estimate price sensitivity to yield changes.

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP).

Q.4888 Alex, an investor, is analyzing a bond issued by XYZ Corporation. The bond has a coupon rate of 2%, paid annually, and matures in ten years. If its yield-to-maturity is 1%, its modified duration is *most likely*:

A. less than its Macaulay duration.

B. the same as its Macaulay duration.

C. greater than its Macaulay duration.

The correct answer is **A.**

The relationship between Macaulay duration and modified duration is given by the following formula:Given that the yield-to-maturity is 1%:

$$1 + r = 1 + 0.01 = 1.01$$

Since the denominator (1.01) is greater than 1, the modified duration will be less than the Macaulay duration because dividing by a number greater than 1 reduces the result.

Therefore, when the yield-to-maturity is positive, the Macaulay duration will be greater than the modified duration.

B is incorrect: The modified duration is only equal to the Macaulay duration if the yield is 0%, which would make the denominator equal to 1. Since the yield here is 1%, the modified duration will not be the same as the Macaulay duration.

C is incorrect: If the yield-to-maturity were negative, the denominator would be less than 1, making the modified duration greater than the Macaulay duration.

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP).

Q.4889 Emma is evaluating a zero-coupon bond issued by ABC Corporation. The bond matures in seven years and is currently priced to yield 4% p.a. Emma is interested in understanding the bond's sensitivity to changes in interest rates. Given this information, the modified duration of this bond is *most likely*:

      A. less than seven years.

      B. seven years.

      C. more than seven years.

The correct answer is **A.**

To understand the Macaulay duration and Modified durations, lets first calculate the modified duration:

$$\text{ModDur} = \frac{\text{Macaulay Duration}}{1 + r} = \frac{7 \text{ years}}{1 + 0.04} = \frac{7 \text{ years}}{1.04} = 6.731 \text{ years}$$

The calculation shows that the modified duration is approximately 6.731 years, which is less than seven years. The modified duration of a zero-coupon bond is always less than its Macaulay duration when the yield is positive. This adjustment accounts for the time value of money, making the modified duration a more accurate measure of interest rate sensitivity.

B is incorrect: The modified duration cannot be exactly seven years if the yield is positive.

C is incorrect: With a positive yield of 4%, the modified duration will always be less than the Macaulay duration. If the yield were negative, the modified duration could be greater than the Macaulay duration.

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP).

Q.4890 David is analyzing a 3-year zero-coupon bond issued by the UK government and a 10-year corporate bond issued by XYZ Corp. The UK government bond is priced to yield 1%, and the XYZ Corp bond has a coupon rate of 5%, paid semiannually, with a yield-to-maturity of 4%. Assuming the bonds were issued on the same date and it is now exactly one year later, which bond *most likely* has the longest Macaulay duration?

        A. UK government bond.

        B. XYZ Corp bond.

        C. Both bonds have the same Macaulay duration.

The correct answer is **B.**

Since one year has passed, so the remaining maturity is now 9 years. The Macaulay duration of a coupon bond is typically less than its time to maturity but still significant, especially for longer-term bonds. Therefore, the XYZ Corp bond's Macaulay duration is greater than the 2-year duration of the zero-coupon UK government bond.

A is correct: The Macaulay duration of a zero-coupon bond is equal to its time to maturity. Given one year has passed, the remaining maturity is now 2 years.

C is incorrect: The UK government bond's duration is equal to its remaining maturity (2 years), whereas the XYZ Corp bond's duration, though less than its 9-year remaining maturity, will be greater than 2 years due to the longer remaining maturity and periodic coupon payments.

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP).

Q.4891 Jessica is comparing two bonds: a 5-year semiannual coupon bond issued by DEF Corp with a coupon rate of 3% and a yield-to-maturity of 2%, and a 20-year annual coupon bond issued by GHI Corp with a coupon rate of 6% and a yield-to-maturity of 5%. Assuming interest rates increase by 50 basis points immediately, which bond's price will *likely* decrease the most in percentage terms?

     A. GHI Corp bond

     B. DEF Corp bond

     C. Both bonds will decrease by the same percentage

The correct answer is **A.**

The GHI Corp bond has a 20-year maturity and pays annual coupons. Long-term bonds generally have higher durations, meaning they are more sensitive to interest rate changes. With duration likely around 14-15 years, this bond will experience a greater price decrease than the DEF Corp bond.

B is incorrect: Although the DEF Corp bond has a 5-year maturity and semiannual coupons, its duration will be shorter than that of the GHI Corp bond due to the shorter maturity period. Bonds with shorter durations are less sensitive to interest rate changes.

C is incorrect: The GHI Corp bond's longer duration means its price will decrease more in percentage terms compared to the DEF Corp bond when interest rates increase.

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP).

Q.4892 Michael is evaluating a 4-year zero-coupon bond issued by the US Treasury and an 8-year semiannual coupon bond issued by ABC Inc. with a coupon rate of 4% and a yield-to-maturity of 3%. Assuming the bonds were issued on the same date and it is now exactly one year later, the bond with the lowest modified duration is *most likely*:

     A. US Treasury bond.

     B. ABC Inc. bond.

     C. Both bonds have the same modified duration.

The correct answer is **A.**

Since one year has passed, the remaining maturity is now 3 years. The modified duration of a zero-coupon bond is equal to its Macaulay duration divided by (1 + yield per period). For the US Treasury bond, the modified duration is approximately 2.913 years where 3 years is divided by (1 + 0.03). Zero-coupon bonds generally have lower modified durations compared to similar maturity coupon bonds because there are no interim cash flows.

B is incorrect: Since one year has passed, the remaining maturity is now 7 years. The ABC Inc. bond, with semiannual coupons, will have a higher modified duration compared to the zero-coupon US Treasury bond. The presence of semiannual coupons and the longer remaining maturity contribute to a higher modified duration.

C is incorrect: The US Treasury bond, being a zero-coupon bond with a 3-year remaining maturity, will have a lower modified duration compared to the 7-year semiannual coupon bond issued by ABC Inc.

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP).

Q.4893 Consider a bond issued by XYZ Corporation, which pays semi-annual coupons. The bond has a coupon rate of 5%, a yield-to-maturity of 4%, and a time-to-maturity of 10 years. John, a financial analyst, observes that between coupon payments, the yield-to-maturity remains constant. How does the Macaulay duration of XYZ Corporation's bond change between coupon payments if the yield-to-maturity remains unchanged?

      A. Decreases throughout the coupon period.

      B. Increases throughout the coupon period.

      C. Remains constant throughout the coupon period.

The correct answer is **A.**

As time passes and the next coupon payment approaches, the time remaining to receive future cash flows decreases, causing the Macaulay duration to decrease.

B is incorrect: Duration decreases as time to cash flows shortens; it does not increase.

C is incorrect: Duration changes as time to each future cash flow decreases, so it cannot remain constant.

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (b): Explain how a bond's maturity, coupon, and yield level affect its interest rate risk.

Q.4894 Consider two bonds issued by ABC Corporation, both with a time-to-maturity of 10 years and a yield-to-maturity of 5%. Bond A trades at a premium, while Bond B trades at a discount. Mary, a portfolio manager, is analysing these bonds' interest rate risk and duration characteristics. Which statement about the Macaulay duration of these bonds is *most accurate*?

      A. The Macaulay duration of Bond A is higher than that of Bond B.

      B. The Macaulay duration of Bond A is the same as that of Bond B.

      C. The Macaulay duration of Bond A is lower than that of Bond B.

The correct answer is **C.**

The premium bond A has higher coupon payments, which means more of its cash flows are received earlier compared to the discount bond B. This reduces the weighted average time to receive the bond's cash flows, resulting in a lower Macaulay duration.

A is incorrect: Bond B (discount bond) has lower coupon payments, meaning its duration is higher due to a greater concentration of value in the final payment.

B is incorrect: Despite having the same time-to-maturity and yield-to-maturity, the higher coupon payments of Bond A cause its duration to differ from Bond B.

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (b): Explain how a bond's maturity, coupon, and yield level affect its interest rate risk.

Q.4895 An investor is considering purchasing a perpetual bond that pays an annual coupon of $50. The current market yield for similar bonds is 5%. The Macaulay duration is *closest to:*

        A. 15 years.

        B. 18 years.

        C. 21 years.

The correct answer is **C.**

The formula for Macaulay Duration of a Perpetual Bond is given as:

$$\text{MacDur} = \frac{1+r}{r} = \frac{1.05}{0.05} = 21 \text{ years}$$

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP).

Q.4896 A floating-rate note has a coupon period of 180 days. If 45 days have passed since the last coupon reset, the Macaulay duration of the note is *closest to:*

 A. 0.25

 B. 0.50

 C. 0.75

The correct answer is **C.**

Formula for Macaulay Duration of Floating-Rate Notes is given as:

$$\text{MacDur}_{\text{Floating}} = \frac{T - t}{T}$$

Where;

$$T = 180 \text{ days}$$

$$t = 45 \text{ days}$$

Substitute the given values:

$$\text{MacDur}_{\text{Floating}} = \frac{180 - 45}{180} = \frac{135}{180} = 0.75$$

CFA Level I, Fixed Income, Learning Module 11: Yield Based Bond Duration Measures and Properties. LOS (a): Define, calculate, and interpret modified duration, money duration, and the price value of a basis point (PVBP).