Question #1 of 107

Question ID: 1458743

A bond has a modified duration of 7 and convexity of 100. If interest rates decrease by 1%, the price of the bond will *most likely:*

A) decrease by 7.5%.

B) increase by 6.5%.

C) increase by 7.5%.

Explanation

Percentage Price Change = –(duration) (ΔYTM) + (½)convexity (ΔYTM)^2

therefore

Percentage Price Change = –(7) (–0.01) + (½)(100) (–0.01)^2=7.5%.

(Module 46.3, LOS 46.i)

Question #2 of 107

Question ID: 1458735

The price of a bond is equal to $101.76 if the term structure of interest rates is flat at 5%. The following bond prices are given for up and down shifts of the term structure of interest rates. Using the following information what is the approximate percentage price change of the bond using effective duration and assuming interest rates decrease by 0.5%?

Bond price: $98.46 if term structure of interest rates is flat at 6%

Bond price: $105.56 if term structure of interest rates is flat at 4%

A) 1.74%.

B) 0.174%.

C) 0.0087%.

Explanation

The effective duration is computed as follows:

$$\text{Effective duration} = \frac{105.56 \text{ - } 98.46}{2 \times 101.76 \times 0.01} = 3.49$$

Using the effective duration, the approximate percentage price change of the bond is computed as follows:

Percent price change = -3.49 × (-0.005) × 100 = 1.74%

(Module 46.3, LOS 46.i)

Question #3 of 107

Question ID: 1458732

Given a bond with a modified duration of 1.93, if required yields increase by 50 basis points, the price would be expected to decrease by:

A) 1.930%.

B) 0.965%.

C) 0.009%.

Explanation

Modified duration indicates the expected percent change in a bond's price given a 1% (100 bp) change in yield to maturity. For a 50 bp (0.5%) increase in YTM, the price of a bond with modified duration of 1.93 should decrease by approximately 0.5(1.93%) = 0.965%.

(Module 46.3, LOS 46.i)

Question #4 of 107

Question ID: 1458761

The approach to estimating duration that relies on using historical relationships between benchmark yield changes and bond price changes is:

A) modified duration.

B) analytical duration.

C) empirical duration.

Explanation

Empirical duration is estimated by using historical data between benchmark yield changes and bond price changes. Analytical duration approaches based on mathematical analysis include Macaulay, modified, and effective durations.

(Module 46.3, LOS 46.m)

Question #5 of 107

Question ID: 1458668

Calculate the effective duration for a 7-year bond with the following characteristics:

- Current price of $660
- A price of $639 when the yield curve shifts up 50 basis points
- A price of $684 when the yield curve shifts down by 50 basis points

A) 6.5.

B) 6.8.

C) 3.1.

Explanation

The formula for calculating the effective duration of a bond is:

$$\frac{V_{-} - V_{+}}{2V_0(\Delta \text{curve})}$$

where:

- V_- = bond value if the yield decreases by Δy
- V_+ = bond value if the yield increases by Δy
- V_0 = initial bond price

The effective duration of this bond is calculated as:

$$\frac{684 - 639}{2(660)(0.005)} = 6.8$$

(Module 46.1, LOS 46.b)

Question #6 of 107

Question ID: 1462944

On Monday, the yield curve is upward sloping with yields of 3%, 4%, and 5.5% on 1-year, 5-year, and 10-year government bonds, respectively. The following day, the yield curve experiences an upward parallel shift equal to 50 basis points. Other things equal, which of the following noncallable 6% coupon bonds is likely to experience the smallest percent change in price as a result of the yield curve shift?

A) Zero coupon government bond maturing in five years.

B) Par value government bond maturing in five years.

C) Par value government bond maturing in ten years.

Explanation

The bond with the least percentage price change will be the bond with the lowest interest rate risk. Higher coupons or shorter maturities decrease interest rate risk. The coupon paying bond with only five years to maturity will have the lowest interest rate risk.

(Module 46.2, LOS 46.e)

Question #7 of 107

Question ID: 1458674

A non-callable bond with 10 years remaining maturity has an annual coupon of 5.5% and a $1,000 par value. The yield to maturity on the bond is 4.7%. Which of the following is *closest* to the estimated price change of the bond using duration if rates rise by 75 basis points?

A) -$61.10.

B) -$5.68.

C) -$47.34.

Explanation

First, compute the current price of the bond as: FV = 1,000; PMT = 55; N = 10; I/Y = 4.7; CPT → PV = –1,062.68. Then compute the price of the bond if rates rise by 75 basis points to 5.45% as: FV = 1,000; PMT = 55; N = 10; I/Y = 5.45; CPT → PV = –1,003.78. Then compute the price of the bond if rates fall by 75 basis points to 3.95% as: FV = 1,000; PMT = 55; N = 10; I/Y = 3.95; CPT → PV = –1,126.03.

The formula for approximate modified duration is: $(V_{-}–V_{+})$ / $(2V_0\Delta y)$. Therefore, modified duration is: ($1,126.03 – $1,003.78) / (2 × $1,062.68 × 0.0075) = 7.67.

The formula for the percentage price change is then: –(duration)(ΔYTM). Therefore, the estimated *percentage price change* using duration is: –(7.67)(0.75%) = –5.75%. The estimated *price change* is then: (–0.0575)($1,062.68) = –$61.10

(Module 46.1, LOS 46.b)

Question #8 of 107

Question ID: 1458733

A callable bond trading at $1,000 has an effective duration of 5 and modified duration of 6. If the market yield increases by 1% the bond's price will decrease by approximately:

A) $60.

B) $50.

C) $55.

Explanation

Effective duration should be used for callable bonds as it takes into account the impact the embedded option has on the bond's cash flows.

Approximate percentage price change of a bond = (–)(effective duration)(ΔYTM)

(–5)(1%) = –5%

The change in price is therefore $1,000 × –5% = –$50

(Module 46.3, LOS 46.i)

Question #9 of 107

Question ID: 1458758

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 46.3, LOS 46.k)

Question #10 of 107

Question ID: 1462941

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

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

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

C) investment horizon at which a bond's market price risk and reinvestment risk exactly offset.

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 46.1, LOS 46.b)

Question #11 of 107

Question ID: 1458689

Sensitivity of a bond's price to a change in yield at a specific maturity is *least appropriately* estimated by using:

A) effective duration. ✓

B) key rate duration. ✗

C) partial duration. ✗

Explanation

Effective duration is used to measure the sensitivity of a bond price to a parallel shift in the yield curve. Key rate duration, also known as partial duration, is used to measure the sensitivity of a bond price to a change in yield at a specific maturity.

(Module 46.2, LOS 46.d)

Question #12 of 107

Question ID: 1458720

An annual-pay bond is priced at 101.50. If its yield to maturity decreases 100 basis points, its price will increase to 105.90. If its yield to maturity increases 100 basis points, its price will decrease to 97.30. The bond's approximate modified convexity is *closest to*:

A) 0.2. ✗

B) 19.7. ✓

C) 4.2. ✗

Explanation

Approximate modified convexity is calculated as [$V_- + V_+ - 2V_0$] / [(V_0)(change in YTM)^2]. [105.90 + 97.30 – 2(101.50)] / [101.50$(0.01)^2$] = 19.70.

(Module 46.3, LOS 46.h)

Question #13 of 107

Question ID: 1458728

Negative effective convexity will *most likely* be exhibited by a:

A) callable bond at high yields.

B) callable bond at low yields.

C) putable bond at high yields.

Explanation

A callable bond trading at a low yield will most likely exhibit negative effective convexity.

(Module 46.3, LOS 46.h)

Question #14 of 107

Question ID: 1458756

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 46.3, LOS 46.k)

Question #15 of 107

Question ID: 1458708

Which of the following is a limitation of the portfolio duration measure? Portfolio duration only considers:

A) a linear approximation of the actual price-yield function for the portfolio.

B) a nonparallel shift in the yield curve.

C) the market values of the bonds.

Explanation

Duration is a linear approximation of a nonlinear function. The use of market values has no direct effect on the inherent limitation of the portfolio duration measure. Duration assumes a parallel shift in the yield curve, and this is an additional limitation.

(Module 46.2, LOS 46.f)

Question #16 of 107

Question ID: 1462942

All else equal, which of the following is *least likely* to increase the interest rate risk of a bond?

A) Inclusion of a call feature.

B) A longer maturity.

C) A decrease in the YTM.

Explanation

Inclusion of a call feature will decrease the duration of a fixed income security. The other choices increase duration.

(Module 46.2, LOS 46.e)

Question #17 of 107

Question ID: 1462947

Martina Whittaker runs a fixed-income portfolio that contains a $12 million full price position in the corporate bonds of Dewey Treadmills. Whittaker is concerned that interest rates are likely to rise and has calculated an annual modified duration of 8.0 for the Dewey bonds. The money duration of the position in Dewey bonds is *closest* to:

A) \$9.6 million.

B) \$48.0 million.

C) \$96.0 million.

Explanation

Money duration = annual modified duration × portfolio value = 8 × \$12 million = \$96,000,000.

(Module 46.2, LOS 46.g)

Question #18 of 107

Question ID: 1458692

Which of the following bonds has the *highest* interest rate sensitivity? A:

A) five year, 5% coupon bond callable in one year.

B) ten year, option-free 4% coupon bond.

C) ten year, option-free 6% coupon bond.

Explanation

If two bonds are identical in all respects except their term to maturity, the longer term bond will be more sensitive to changes in interest rates. All else the same, if a bond has a lower coupon rate when compared with another, it will have greater interest rate risk. Therefore, for the option-free bonds, the 10 year 4% coupon is the longest term and has the lowest coupon rate. The call feature does not make a bond more sensitive to changes in interest rates, because it places a ceiling on the maximum price investors will be willing to pay. If interest rates decrease enough the bonds will be called.

(Module 46.2, LOS 46.e)

Question #19 of 107

Question ID: 1458737

A bond has a duration of 10.62 and a convexity of 182.92. For a 200 basis point increase in yield, what is the approximate percentage price change of the bond?

A) -1.62%.

B) -17.58%.

C) -24.90%.

Explanation

The estimated price change is:

$$-(\text{duration})(\Delta YTM) + ½(\text{convexity}) \times (\Delta YTM)^2 = -10.62 \times 0.02 + (½)(182.92)(0.02^2) = -0.2124 + 0.0366 = -0.1758 \text{ or } –17.58\%.$$

(Module 46.3, LOS 46.i)

Question #20 of 107

Question ID: 1462943

All other things being equal, which of the following bonds has the greatest duration?

A) 5-year, 8% coupon bond.

B) 15-year, 8% coupon bond.

C) 15-year, 12% coupon bond.

Explanation

If bonds are identical except for maturity and coupon, the one with the longest maturity and lowest coupon will have the greatest duration. The later the cash flows are received, the greater the duration.

(Module 46.2, LOS 46.e)

Question #21 of 107

Question ID: 1458711

Which of the following is *least likely* an advantage of estimating the duration of a bond portfolio as a weighted average of the durations of the bonds in the portfolio?

A) It can be used when the portfolio contains bonds with embedded options.

B) It is theoretically more sound than the alternative.

C) It is easier to calculate than the alternative.

Explanation

Compared to portfolio duration based on the cash flow yield of the portfolio, portfolio duration calculated as a weighted average of the durations of the individual bonds in the portfolio is easier to calculate and can be used for bonds with embedded options. Portfolio duration calculated using the cash flow yield for the entire portfolio is theoretically more correct.

(Module 46.2, LOS 46.f)

Question #22 of 107

Question ID: 1462949

A bond priced at par ($1,000) has a modified duration of 8 and a convexity of 100. If interest rates fall 50 basis points, the new price will be *closest* to:

A) $1,041.25.

B) $875.00.

C) $958.75.

Explanation

$$\frac{\Delta \mathrm{P}}{\mathrm{P}} = -\mathrm{Duration}(\Delta \mathrm{YTM}) + \frac{1}{2}\mathrm{Convexity}(\Delta \mathrm{YTM})^2$$

$$\begin{aligned}\frac{\Delta \mathrm{P}}{\mathrm{P}} &= (-)(8)(-0.005) + \frac{1}{2}(100)(-0.005)^2 \\ &= +0.0400 + 0.00125 \\ &= +0.04125, \text{ or up } 4.125\%\end{aligned}$$

The price would thus be $1,000 × 1.04125 = $1,041.25.

(Module 46.3, LOS 46.i)

Question #23 of 107

Question ID: 1458697

In comparing the price volatility of putable bonds to that of option-free bonds, a putable bond will have:

A) less price volatility at higher yields.

B) less price volatility at low yields.

C) more price volatility at higher yields.

Explanation

The only true statement is that putable bonds will have less price volatility at higher yields. At higher yields the put becomes more valuable and reduces the decline in price of the putable bond relative to the option-free bond. On the other hand, when yields are low, the put option has little or no value and the putable bond will behave much like an option-free bond. Therefore at low yields a putable bond will not have more price volatility nor will it have less price volatility than a similar option-free bond.

(Module 46.2, LOS 46.e)

Question #24 of 107

Question ID: 1458659

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 46.1, LOS 46.a)

Question #25 of 107

Question ID: 1458726

How does the price-yield relationship for a callable bond compare to the same relationship for an option-free bond? The price-yield relationship is *best* described as exhibiting:

A) negative convexity at low yields for the callable bond and positive convexity for the option-free bond. ✓

B) negative convexity for the callable bond and positive convexity for an option-free bond. ✗

C) the same convexity for both bond types. ✗

Explanation

Since the issuer of a callable bond has an incentive to call the bond when interest rates are very low in order to get cheaper financing, this puts an upper limit on the bond price for low interest rates and thus introduces negative convexity between yields and prices.

(Module 46.3, LOS 46.h)

Question #26 of 107

Question ID: 1458741

Consider a bond with modified duration of 5.61 and convexity of 43.84. Which of the following is *closest* to the estimated percentage price change in the bond for a 75 basis point decrease in interest rates?

A) 4.12%.

B) 4.21%.

C) 4.33%.

Explanation

The estimated percentage price change is equal to the duration effect plus the convexity effect. The formula is: [–duration × (ΔYTM)] + ½[convexity × $(\Delta YTM)^2$]. Therefore, the estimated percentage price change is: [–(5.61)(–0.0075)] + [(½)(43.84)$(-0.0075)^2$] = 0.042075 + 0.001233 = 0.043308 = 4.33%.

(Module 46.3, LOS 46.i)

Question #27 of 107

Question ID: 1458657

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) less than 7.515%.

C) 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 46.1, LOS 46.a)

Question #28 of 107

Question ID: 1458725

Which of the following is *most* accurate about a bond with positive convexity?

A) Positive changes in yield lead to positive changes in price.

B) Price increases and decreases at a faster rate than the change in yield.

C) Price increases when yields drop are greater than price decreases when yields rise by the same amount.

Explanation

A convex price/yield graph has a larger increase in price as yield decreases than the decrease in price when yields increase.

(Module 46.3, LOS 46.h)

Question #29 of 107

Question ID: 1458760

When using duration and convexity to estimate the effect on a bond's value of changes in its credit spread, an analyst should *most appropriately* use:

A) a convexity measure that has been adjusted for the bond’s credit risk.

B) Macaulay duration rather than modified duration.

C) the same method used when estimating the effect of changes in yield.

Explanation

We can use duration and convexity to estimate the price effect of changes in spread in the same way we use them to estimate the price effect of changes in yield:

> Percent change in bond value = –duration(change in yield or spread) + (1/2)(convexity)(squared change in yield or spread)

No adjustment for credit risk is needed and an analyst should use modified or effective duration.

(Module 46.3, LOS 46.l)

Question #30 of 107

Question ID: 1458715

The price value of a basis point (PVBP) for a 18 year, 8% annual pay bond with a par value of $1,000 and yield of 9% is *closest* to:

A) $0.44.

B) $0.80.

C) $0.82.

Explanation

PVBP = initial price – price if yield changed by 1 bps.

Initial price:	Price with change:
FV = 1000	FV = 1000
PMT = 80	PMT = 80
N = 18	N = 18
I/Y = 9%	I/Y = 9.01
CPT PV = 912.44375	CPT PV = 911.6271

PVBP = 912.44375 – 911.6271 = 0.82

(Module 46.2, LOS 46.g)

Question #31 of 107

Question ID: 1458740

Assume that a straight bond has a duration of 1.89 and a convexity of 32. If interest rates decline by 1% what is the total estimated percentage price change of the bond?

A) 1.56%.

B) 1.89%.

C) 2.05%.

Explanation

The total percentage price change estimate is computed as follows:

> Total estimated price change = -1.89 × (-0.01) × 100 + (½)(32) × $(-0.01)^2$ × 100 = 2.05%

(Module 46.3, LOS 46.i)

Question #32 of 107

Question ID: 1458661

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 46.1, LOS 46.a)

Question #33 of 107

Question ID: 1458677

Consider a 25-year, $1,000 par semiannual-pay bond with a 7.5% coupon and a 9.25% YTM. Based on a yield change of 50 basis points, the approximate modified duration of the bond is *closest to*:

A) 10.03.

B) 12.50.

C) 8.73.

Explanation

Calculate the new bond prices at the 50 basis point change in rates both up or down and then plug into the approximate modified duration equation:

> Current price: N = 50; FV = 1,000; PMT = (0.075/2) × 1,000 = 37.50; I/Y = 4.625; CPT → PV = $830.54.
>
> +50 basis pts: N = 50; FV = 1,000; PMT = (0.075/2)1,000 = 37.50; I/Y = 4.875; CPT → PV = $790.59.
>
> –50 basis pts: N = 50; FV = 1,000; PMT = (0.075/2)1,000 = 37.50; I/Y = 4.375; CPT → PV = $873.93.
>
> Approximate modified duration = (873.93 – 790.59) / (2 × 830.54 × 0.005) = 10.03.

(Module 46.1, LOS 46.b)

Question #34 of 107

Question ID: 1458696

Holding other factors constant, the interest rate risk of a coupon bond is higher when the bond's:

A) coupon rate is higher.

B) current yield is higher.

C) yield to maturity is lower.

Explanation

In this case the only determinant that will cause higher interest rate risk is having a low yield to maturity. A higher coupon rate and a higher current yield will result in lower interest rate risk.

(Module 46.2, LOS 46.e)

Question #35 of 107

Question ID: 1458699

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 is 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 × 100 × 0.005) = 6.15. Remember that the change in interest rates must be in decimal form.

(Module 46.2, LOS 46.e)

Question #36 of 107

Question ID: 1458710

The price value of a basis point (PVBP) for a bond is most accurately described as:

A) an estimate of the curvature of the price-yield relationship for a small change in yield.

B) the product of a bond's value and its duration.

C) the change in the price of the bond when its yield changes by 0.01%.

Explanation

PVBP represents the change in the price of the bond when its yield changes by one basis point, or 0.01%. PVBP = duration × 0.0001 × bond value. This calculation ignores convexity because for a small change in yield, the curvature of the price-yield relationship typically has no material effect on the PVBP.

(Module 46.2, LOS 46.f)

Question #37 of 107

Question ID: 1458687

Key rate duration is *best* described as a measure of price sensitivity to a:

A) change in a bond's cash flows. ✗

B) change in yield at a single maturity. ✓

C) parallel shift in the benchmark yield curve. ✗

Explanation

Key rate duration is the price sensitivity of a bond or portfolio to a change in the interest rate at one specific maturity on the yield curve.

(Module 46.2, LOS 46.d)

Question #38 of 107

Question ID: 1458709

Donald McKay, CFA, is analyzing a client's fixed income portfolio. As of the end of the last quarter, the portfolio had a market value of $7,545,000 and a portfolio duration of 6.24. McKay is predicting that the yield for all of the securities in the portfolio will decline by 25 basis points next quarter. If McKay's prediction is accurate, the market value of the portfolio:

A) at the end of the next quarter will be approximately $7,427,300. ✗

B) will increase by approximately $117,700. ✓

C) will increase by approximately 6.24%. ✗

Explanation

A portfolio's duration can be used to estimate the approximate change in value for a given change in yield. A critical assumption is that the yield for all bonds in the portfolio change by the same amount, known as a parallel shift. For this portfolio the expected change in value can be calculated as: $7,545,000 × 6.24 × 0.0025 = $117,702. The decrease in yields will cause an increase in the value of the portfolio, not a decrease.

(Module 46.2, LOS 46.f)

Question #39 of 107

Question ID: 1458693

Which of the following statements about an embedded call feature in a bond is *least* accurate? The call feature:

A) exposes investors to additional reinvestment rate risk.

B) reduces the bond's capital appreciation potential.

C) increases the bond's duration, increasing price risk.

Explanation

A call provision *decreases* the bond's duration because a call provision introduces prepayment risk that should be factored in the calculation.

For the investor, one of the most significant risks of callable (or prepayable) bonds is that they can be called/retired prematurely. Because bonds are nearly always called for prepayment after interest rates have decreased significantly, the investor will find it nearly impossible to find comparable investment vehicles. Thus, investors have to replace their high-yielding bonds with much lower-yielding issues. From the bondholder's perspective, a called bond means not only a disruption in cash flow but also a sharply reduced rate of return.

Generally speaking, the following conditions apply to callable bonds:

- *The cash flows associated with callable bonds become unpredictable,* since the life of the bond could be much shorter than its term to maturity, due to the call provision.
- The bondholder is exposed to the risk of investing the proceeds of the bond at lower interest rates after the bond is called. This is known as *reinvestment risk*.
- *The potential for price appreciation is reduced,* because the possibility of a call limits or caps the price of the bond near the call price if interest rates fall.

(Module 46.2, LOS 46.e)

Question #40 of 107

Question ID: 1458746

An analyst gathered the following information about a 15-year bond:

- 10% semiannual coupon.
- Modified duration of 7.6 years.

If the market yield rises 75 basis points, the bond's approximate price change is a:

A) 5.4% decrease.

B) 5.4% increase.

C) 5.7% decrease.

Explanation

$\Delta P/P = -D\Delta i$

$\Delta P/P = -7.6(+0.0075) = -0.057$, or −5.7%.

(Module 46.3, LOS 46.i)

Question #41 of 107

Question ID: 1458739

An investor gathered the following information about an option-free U.S. corporate bond:

- Par Value of $10 million
- Convexity of 90
- Duration of 7

If interest rates increase 2% (200 basis points), the bond's percentage price change is *closest* to:

A) -12.2%.

B) -14.0%.

C) -15.8%.

Explanation

Recall that the percentage change in prices = Duration effect + Convexity effect = [-duration × (change in yields)] + [(½)convexity × (change in yields)^2] = [(-7)(0.02) + (½)(90)(0.02)^2] = -0.12 = -12.2%. Remember that you must use the decimal representation of the change in interest rates when computing the duration and convexity adjustments.

(Module 46.3, LOS 46.i)

Question #42 of 107

Question ID: 1462948

If interest rates decrease by 50 basis points, a 10-year, 6% coupon, option-free bond will increase in price by $36. If instead interest rates increase by 50 basis points, this bond's price will decrease by:

A) $36.

B) less than $36.

C) more than $36.

Explanation

The bond described will have positive convexity. Because of convexity, the bond's price will decrease less as a result of a given increase in interest rates than it will increase as a result of an equivalent decrease in interest rates.

(Module 46.3, LOS 46.h)

Question #43 of 107

Question ID: 1458762

For a portfolio consisting solely of short-term U.S. government bonds:

A) estimates of empirical and analytical durations should be similar.

B) empirical duration will be significantly lower than analytical duration.

C) analytical duration would be the preferable risk measure.

Explanation

A portfolio consisting solely of short-term U.S. government bonds should closely resemble the performance of its government benchmark yield. As a result, estimates of empirical duration should be similar to the portfolio's analytical durations.

(Module 46.3, LOS 46.m)

Question #44 of 107

Question ID: 1458678

At relatively high yields, the effective duration for a putable bond, compared to the effective duration of an otherwise identical option-free bond, is *most likely*:

A) the same.

B) lower.

C) higher.

Explanation

The effective duration of a putable bond is less than the effective duration of an otherwise identical option-free bond at relatively high yields. Assuming no default, the price of a putable bond will not fall below its put price. The put price acts as a floor. Therefore, as yields increase into the range in which the embedded put option becomes valuable, the price of a putable bond decreases less than that of an otherwise identical option-free bond.

(Module 46.1, LOS 46.b)

Question #45 of 107

Question ID: 1458700

When interest rates increase, the modified duration of a 30-year bond selling at a discount:

A) decreases.

B) does not change.

C) increases.

Explanation

The higher the yield on a bond the lower the price volatility (duration) will be. When interest rates increase the price of the bond will decrease and the yield will increase because the current yield = (annual cash coupon payment) / (bond price). As the bond price decreases the yield increases and the price volatility (duration) will decrease.

(Module 46.2, LOS 46.e)

Question #46 of 107

Question ID: 1458673

A bond's yield to maturity decreases from 8% to 7% and its price increases by 6%, from $675.00 to $715.50. The bond's effective duration is *closest to:*

A) 5.0.

B) 6.0.

C) 7.0.

Explanation

Effective duration is the percentage change in price for a 1% change in yield, which is given as 6.

(Module 46.1, LOS 46.b)

Question #47 of 107

Question ID: 1462940

An option-free 5-year 6% annual-pay bond is selling $979.22 per $1,000 of par value and has a Macaulay duration of 4.4587. The bond's modified duration is *closest* to:

A) 4.187.

B) 4.206.

C) 4.246.

Explanation

The YTM on the bond is 6.5%. N=5, PV = −979.22, PMT = 60, FV=1,000, CPT I/Y = 6.5%

Modified duration = Macaulay duration / (1 + YTM) = 4.4587 / 1.065 = 4.187.

(Module 46.1, LOS 46.b)

Question #48 of 107

Question ID: 1458751

The term structure of yield volatility illustrates the relationship between yield volatility and:

A) yield to maturity.

B) time to maturity.

C) Macaulay duration.

Explanation

The term structure of yield volatility refers to the relationship between yield volatility and time to maturity.

(Module 46.3, LOS 46.j)

Question #49 of 107

Question ID: 1458666

The price of a bond is equal to $101.76 if the term structure of interest rates is flat at 5%. The following bond prices are given for up and down shifts of the term structure of interest rates. Using the following information what is the effective duration of the bond?

Bond price: $98.46 if term structure of interest rates is flat at 6%

Bond price: $105.56 if term structure of interest rates is flat at 4%

A) 3.49.

B) 1.74.

C) 1.56.

Explanation

The effective duration is computed as follows:

$$\text{Effective duration} = \frac{105.56 - 98.46}{2 \times 101.76 \times 0.01} = 3.49$$

(Module 46.1, LOS 46.b)

Question #50 of 107

Question ID: 1458742

A bond has a convexity of 51.44. What is the approximate percentage price change of the bond due to convexity if rates rise by 150 basis points?

A) 0.26%.

B) 0.58%.

C) 0.71%.

Explanation

The convexity effect, or the percentage price change due to convexity, formula is: (½)convexity × $(\Delta YTM)^2$. The percentage price change due to convexity is then: (½)(51.44)$(0.015)^2$ = 0.0058.

(Module 46.3, LOS 46.i)

Question #51 of 107

A bond is priced at 95.80. Using a pricing model, an analyst estimates that a 25 bp parallel upward shift in the yield curve would decrease the bond's price to 94.75, while a 25 bp parallel downward shift in the yield curve would increase its price to 96.75. The bond's effective convexity is *closest to*:

A) 3,340.

B) –167.

C) 4.

Explanation

Approximate effective convexity is calculated as [V_{-} + V_{+} – $2V_0$] / [(V_0)(change in curve)^2].
[96.75 + 94.75 – 2(95.80)] / [(95.80)(0.0025)^2] = –167.01.

(Module 46.3, LOS 46.h)

Question #52 of 107

Question ID: 1458669

An investor finds that for a 1% increase in yield to maturity, a bond's price will decrease by 4.21% compared to a 4.45% increase in value for a 1% decline in YTM. If the bond is currently trading at par value, the bond's approximate modified duration is *closest* to:

A) 4.33.

B) 43.30.

C) 8.66.

Explanation

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

Approximate 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, duration = (104.45 – 95.79)/(2 × 100 × 0.01) = 4.33. Remember that the change in interest rates must be in decimal form.

(Module 46.1, LOS 46.b)

Question #53 of 107

Question ID: 1458714

The price value of a basis point (PVBP) for a 7-year, 10% semiannual pay bond with a par value of $1,000 and yield of 6% is *closest* to:

A) $0.92.

B) $0.64.

C) $0.28.

Explanation

PVBP = initial price – price if yield changed by 1 bps.

Initial price:	Price with change:
FV = 1000	FV = 1000
PMT = 50	PMT = 50
N = 14	N = 14
I/Y = 3%	I/Y = 3.005
CPT PV = 1225.92	CPT PV = 1225.28

PVBP = 1,225.92 – 1,225.28 = 0.64

(Module 46.2, LOS 46.g)

Question #54 of 107

Question ID: 1458695

Suppose the term structure of interest rates makes an instantaneous parallel upward shift of 100 basis points. Which of the following securities experiences the largest change in value? A five-year:

A) coupon bond with a coupon rate of 5%.

B) floating rate bond.

C) zero-coupon bond.

Explanation

The duration of a zero-coupon bond is equal to its time to maturity since the only cash flows made is the principal payment at maturity of the bond. Therefore, it has the highest interest rate sensitivity among the four securities.

A floating rate bond is incorrect because the duration, which is the interest rate sensitivity, is equal to the time until the next coupon is paid. So this bond has a very low interest rate sensitivity.

A coupon bond with a coupon rate of 5% is incorrect because the duration of a coupon paying bond is lower than a zero-coupon bond since cash flows are made before maturity of the bond. Therefore, its interest rate sensitivity is lower.

(Module 46.2, LOS 46.e)

Question #55 of 107

Question ID: 1458688

Which of the following duration measures is *most appropriate* if an analyst expects a non-parallel shift in the yield curve?

A) Effective duration. ✗

B) Key rate duration. ✓

C) Modified duration. ✗

Explanation

Price sensitivity to a non-parallel shift in the yield curve can be estimated using key rate durations. Modified duration and effective duration measure price sensitivity to a parallel shift in the yield curve.

(Module 46.2, LOS 46.d)

Question #56 of 107

Question ID: 1458662

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 46.1, LOS 46.a)

Question #57 of 107

Question ID: 1458675

For large changes in yield, which of the following statements about using duration to estimate price changes is *most accurate*? Duration alone:

A) overestimates the increase in price for decreases in yield. ✗

B) overestimates the increase in price for increases in yield. ✗

C) underestimates the increase in price for decreases in yield. ✓

Explanation

For large changes in yield, duration underestimates the increase in price when yield decreases and overestimates the decrease in price when yield increases. This is because duration is a linear estimate that does not account for the convexity (curvature) in the price/yield relationship.

(Module 46.1, LOS 46.b)

Question #58 of 107

Question ID: 1462939

The approximate modified duration of an option-free 20-year 7% annual-pay par bond based on a 25 basis point change in yield is *closest* to:

A) 5.3. ✗

B) 10.6. ✓

C) 13.7. ✗

Explanation

If the yield on the bond were 7.25%, the price would be 97.402 and would be 102.701 if the yield were 6.75%. The approximate modified duration for this bond based on a 25 basis point change in yield is calculated as:

$$\frac{102.701 - 97.402}{2(100)(0.0025)} = 10.5976$$

(Module 46.1, LOS 46.b)

Question #59 of 107

Question ID: 1458686

The appropriate measure of interest rate sensitivity for bonds with an embedded option is:

A) effective duration.

B) Macaulay duration.

C) modified duration.

Explanation

Effective duration is appropriate for bonds with embedded options because their future cash flows are affected by the level and path of interest rates.

(Module 46.1, LOS 46.c)

Question #60 of 107

Question ID: 1458716

A $100,000 par value bond has a full price of $99,300, a Macaulay duration of 6.5, and an annual modified duration of 6.1. The bond's money duration per $100 par value is *closest to*:

A) $6.06.

B) $606.

C) $645.

Explanation

Money duration per $100 par value = annual modified duration × full price per $100 par value = 6.1 × $99.30 = $605.73

(Module 46.2, LOS 46.g)

Question #61 of 107

Question ID: 1462950

Wendy Jones, CFA, is reviewing a current bond holding. The bond's duration is 10 and its convexity is 200. Jones believes that interest rates will decrease by 100 basis points. If Jones's forecast is accurate, the bond's price will change by approximately:

A) –8.0%.

B) +11.0%.

C) +8.0%.

Explanation

You can answer this question without calculations. A decrease in interest rates must cause the price to increase. Because duration alone will underestimate a price increase, the price must increase by more than 10%.

$$\begin{aligned}&\text{percentage change in price}\\&= [-\text{duration} \times \Delta\text{YTM}] + \frac{1}{2}\left[\text{convexity} \times (\Delta\text{YTM})^2\right] \times 100\\&= [(-10)(-0.01)] + \frac{1}{2}\left[(200)(-0.01)^2\right] = 0.11 = 11\%\end{aligned}$$

(Module 46.3, LOS 46.i)

Question #62 of 107

Question ID: 1458702

An analyst has stated that, holding all else constant, an increase in the maturity of a coupon bond will typically increase its interest rate risk, and that a decrease in the coupon rate of a coupon bond will typically decrease its interest rate risk. The analyst is correct with respect to:

A) only one of these effects.

B) both of these effects.

C) neither of these effects.

Explanation

The analyst is correct incorrect with respect to coupon rate. As the coupon rate decreases, the interest rate risk of a bond increases. Lower coupons cause greater relative weight to be placed on the principal repayment. Because this cash flow occurs farther out in time, its present value is much more sensitive to changes in interest rates. As the coupon rate goes to zero (i.e., a zero-coupon bond), all of the bond's return relies on the return of principal which as stated before is highly sensitive to interest rate changes.

The analyst is correct with respect to maturity. As the maturity of a bond increases, an investor must wait longer for the eventual repayment of the bond principal. As the length of time until principal payment increases, the probability that interest rates will change increases. If interest rates increase, the present value of the final payment (which is the largest cash flow of the bond) decreases. At longer maturities, the present value decreases by greater amounts. Thus, interest rate risk typically increases as the maturity of the bond increases. (The exception is for long-term discount bonds, which may exhibit a range of long maturities over which an increase in maturity decreases interest rate risk.)

(Module 46.2, LOS 46.e)

Question #63 of 107

Question ID: 1458667

A noncallable bond with seven years remaining to maturity is trading at 108.1% of par value and has an 8.5% coupon. If interest rates rise 50 basis points, the bond's price will fall to 105.3% and if rates fall 50 basis points, the bond's price will rise to 111.0%. Which of the following is *closest* to the effective duration of the bond?

A) 5.27. ✓

B) 5.54. ✗

C) 6.12. ✗

Explanation

The formula for effective duration is: $(V_{-} - V_{+}) / (2V_0\Delta\text{curve})$. Therefore, effective duration is: ($1.110 – $1.053) / (2 × $1.081 × 0.005) = 5.27.

(Module 46.1, LOS 46.b)

Question #64 of 107

Question ID: 1458730

Jayce Arnold, a CFA candidate, considers a $1,000 face value, option-free bond issued at par. Which of the following statements about the bond's dollar price behavior is *most likely* accurate when yields rise and fall by 200 basis points, respectively? Price will:

A) decrease by $124, price will increase by $149.

B) decrease by $149, price will increase by $124.

C) increase by $149, price will decrease by $124.

Explanation

As yields increase, bond prices fall, the price curve gets flatter, and changes in yield have a smaller effect on bond prices. As yields decrease, bond prices rise, the price curve gets steeper, and changes in yield have a larger effect on bond prices. Thus, the price increase when interest rates decline must be greater than the price decrease when interest rates rise (for the same basis point change). Remember that this applies to percentage changes as well.

(Module 46.3, LOS 46.i)

Question #65 of 107

Question ID: 1458745

Vantana Inc. has a bond outstanding with a modified duration of 5.3 and approximate convexity of 110. If yields increase by 1%, the bond price will:

A) decrease by less than 5.3%.

B) decrease by more than 5.3%.

C) increase by more than 5.3%.

Explanation

The positive convexity effect will mean yields will drop by less than 5.3% (the effect of duration alone).

Price change = $(–5.3 \times 0.01) + (0.5 \times 110 \times 0.01^2)$= -0.0475 = –4.75%.

(Module 46.3, LOS 46.i)

Question #66 of 107

Question ID: 1458698

Which of the following bonds is *most likely* to exhibit the greatest volatility due to interest rate changes? A bond with a:

A) high coupon and a long maturity.

B) low coupon and a long maturity.

C) low coupon and a short maturity.

Explanation

Other things equal, a bond with a low coupon and long maturity will have the greatest price volatility.

(Module 46.2, LOS 46.e)

Question #67 of 107

Question ID: 1458731

A non-callable bond has a modified duration of 7.26. Which of the following is the *closest* to the approximate price change of the bond with a 25 basis point increase in rates?

A) -0.018%.

B) 1.820%.

C) -1.820%.

Explanation

The formula for the percentage price change is: –(duration)(ΔYTM). Therefore, the estimated percentage price change using duration is: –(7.26)(0.25%) = –1.82%.

(Module 46.3, LOS 46.i)

Question #68 of 107

Question ID: 1462938

A bond has an effective duration of 7.5. If the bond yield changes by 100 basis points, the price of the bond will change by:

A) approximately 0.75%.

B) approximately 7.5%.

C) exactly 0.75%.

Explanation

The change in price due to a change in yield is only approximate because the calculation of effective duration does not reflect all of the curvature of the price-yield curve (convexity). It is a linear approximation of a non-linear relation.

(Module 46.1, LOS 46.b)

Question #69 of 107

Question ID: 1458701

What happens to bond durations when coupon rates increase and maturities increase?

	As coupon rates increase, duration:	As maturities increase, duration:
A)	decreases	decreases
B)	decreases	increases
C)	increases	increases

Explanation

As coupon rates increase the duration on the bond will decrease because investors are receiving more cash flow sooner. As maturity increases, duration will increase because the payments are spread out over a longer period of time.

(Module 46.2, LOS 46.e)

Question #70 of 107

Question ID: 1458694

Which of the following bonds has the shortest duration? A bond with a:

A) 10-year maturity, 6% coupon rate.

B) 20-year maturity, 6% coupon rate.

C) 10-year maturity, 10% coupon rate.

Explanation

All else constant, a bond with a longer maturity will be more sensitive to changes in interest rates. All else constant, a bond with a lower coupon will have greater interest rate risk.

(Module 46.2, LOS 46.e)

Question #71 of 107

Question ID: 1458747

A 9-year corporate bond with a 3.25% coupon is priced at 103.96. This bond's duration and convexity are 7.8 and 69.8. If the bond's yield increases by 100 basis points, the impact on the bondholder's return is *closest to*:

A) +8.15%.

B) –7.45%.

C) –7.80%.

Explanation

$$\begin{aligned}\text{Return impact} &\approx -(\text{Duration} \times \Delta\text{Yield}) + (1/2) \times (\text{Convexity} \times (\Delta\text{Yield})^2)\\ &\approx -(7.8 \times 0.0100) + (1/2) \times (69.8) \times (0.0100)^2\\ &\approx -0.0780 + 0.0035\\ &\approx -0.0745 \text{ or } -7.45\%\end{aligned}$$

(Module 46.3, LOS 46.i)

Question #72 of 107

Question ID: 1458752

Duration and convexity are *most likely* to produce more accurate estimates of interest rate risk when the term structure of yield volatility is:

A) flat.

B) downward sloping.

C) upward sloping.

Explanation

Duration and convexity assume the yield curve shifts in a parallel manner. A downward (upward) sloping term structure of yield volatility suggests shifts in the yield curve are likely to be non-parallel because short-term interest rates are more (less) volatile than long-term interest rates.

(Module 46.3, LOS 46.j)

Question #73 of 107

Question ID: 1458757

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 46.3, LOS 46.k)

Question #74 of 107

Question ID: 1458663

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 46.1, LOS 46.a)

Question #75 of 107

Question ID: 1458658

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 46.1, LOS 46.a)

Question #76 of 107

Question ID: 1458660

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) less than price risk and the realized yield will be higher than the YTM at purchase.

C) 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 46.1, LOS 46.a)

Question #77 of 107

Question ID: 1458748

A UK 12-year corporate bond with a 4.25% coupon is priced at £107.30. This bond's duration and convexity are 9.5 and 107.2. If the bond's yield decreases by 125 basis points, the estimated price of the bond is *closest to*:

A) £112.72.

B) £121.84.

C) £120.95.

Explanation

Return impact $\approx -(\text{Duration} \times \Delta\text{Yield}) + (1/2) \times (\text{Convexity} \times (\Delta\text{Yield}))^2$

$\approx -(9.5 \times -0.0125) + (1/2) \times (107.2) \times (-0.0125)^2$

$\approx 0.1188 + 0.0084$

≈ 0.1272 or 12.72%

Estimated price of bond $= (1 + 0.1272) \times 107.30$

$= 120.95$

(Module 46.3, LOS 46.i)

Question #78 of 107

Question ID: 1458713

Which of the following is *most likely* to be the money duration of newly issued 360-day eurocommercial paper?

A) 360 days.

B) 4.3%.

C) €25 million.

Explanation

Money duration is expressed in currency units.

(Module 46.2, LOS 46.g)

Question #79 of 107

Question ID: 1458676

Which of the following statements regarding the risks inherent in bonds is *most accurate*?

A) The reinvestment rate assumption in calculating bond yields is generally not significant to the bond's yield.

B) Interest rate risk is the risk that the coupon rate will be adjusted downward if market rates decline.

C) Default risk deals with the likelihood that the issuer will fail to meet its obligations as specified in the indenture.

Explanation

Reinvestment is crucial to bond yield, and interest rate risk is the risk of changes in a bondholder's return due to changes in a bond's yield.

(Module 46.1, LOS 46.b)

Question #80 of 107

Question ID: 1458727

For a given change in yields, the difference between the actual change in a bond's price and that predicted using duration alone will be greater for:

A) a bond with greater convexity.

B) a bond with less convexity.

C) a short-term bond.

Explanation

Duration is a linear measure of the relationship between a bond's price and yield. The true relationship is not linear as measured by the convexity. When convexity is higher, duration will be less accurate in predicting a bond's price for a given change in interest rates. Short-term bonds generally have low convexity.

(Module 46.3, LOS 46.h)

Question #81 of 107

Question ID: 1458755

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 46.3, LOS 46.k)

Question #82 of 107

Question ID: 1458656

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 × 35 = $1,050

Principal repayment: $1,000

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

(Module 46.1, LOS 46.a)

Question #83 of 107

Question ID: 1458754

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 46.3, LOS 46.k)

Question #84 of 107

Question ID: 1462945

A fixed-income portfolio manager is estimating portfolio duration based on the weighted average of the durations of each bond in the portfolio. The manager should calculate duration using:

A) equal-sized increases and decreases in the portfolio's cash flow yield.

B) equal-sized increases and decreases in a benchmark bond's yield.

C) parallel shifts of the benchmark yield curve.

Explanation

Portfolio duration as a weighted average of the individual bonds' durations is calculated assuming parallel shifts in the yield curve. Cash flow yield is used to calculate duration based on the weighted average time until a bond portfolio's cash flows are scheduled to be received.

(Module 46.2, LOS 46.f)

Question #85 of 107

Question ID: 1458685

Effective duration is more appropriate than modified duration as a measure of a bond's price sensitivity to yield changes when:

A) the bond contains embedded options.

B) the bond has a low coupon rate and a long maturity.

C) yield curve changes are not parallel.

Explanation

Effective duration takes into consideration embedded options in the bond. Modified duration does not consider the effect of embedded options. For option-free bonds, modified duration will be similar to effective duration. Both duration measures are based on the value impact of a parallel shift in a flat yield curve.

(Module 46.1, LOS 46.c)

Question #86 of 107

Question ID: 1462937

Compared to a bond's Macaulay duration, its modified duration:

A) may be lower or higher.

B) is lower.

C) is higher.

Explanation

Modified duration = Macaulay duration / (1 + YTM). Modified duration is lower than Macaulay duration unless YTM equals zero.

(Module 46.1, LOS 46.b)

Question #87 of 107

Question ID: 1458670

A non-callable bond with 4 years remaining maturity has an annual coupon of 12% and a $1,000 par value. The current price of the bond is $1,063.40. Given a parallel shift in the yield curve of 50 basis points, which of the following is *closest* to the effective duration of the bond?

A) 2.94.

B) 3.11.

C) 3.27.

Explanation

First, find the current yield to maturity of the bond as:

FV = $1,000; PMT = $120; N = 4; PV = –$1,063.40; CPT → I/Y = 10%

Then compute the price of the bond if rates rise by 50 basis points to 10.5% as:

FV = $1,000; PMT = $120; N = 4; I/Y = 10.5%; CPT → PV = –$1,047.04

Then compute the price of the bond if rates fall by 50 basis points to 9.5% as:

FV = $1,000; PMT = $120; N = 4; I/Y = 9.5%; CPT → PV = –$1,080.11

The formula for effective duration is:

$(V_{-}–V_{+}) / (2V_0\Delta curve)$

Therefore, effective duration is:

($1,080.11 – $1,047.04) / (2 × $1,063.40 × 0.005) = 3.11

(Module 46.1, LOS 46.b)

Question #88 of 107

Question ID: 1462936

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 46.1, LOS 46.a)

Question #89 of 107

Question ID: 1462946

The current price of a $1,000 par value, 6-year, 4.2% semiannual coupon bond is $958.97.

The bond's price value of a basis point is *closest* to:

A) $5.01.

B) $4.20.

C) $0.50.

Explanation

First we compute the yield to maturity of the bond. PV = –$958.97, FV = $1,000, PMT = $21, N = 12, CPT I/Y = 2.5%, multiply by 2 since it is a semiannual bond to get an annualized yield to maturity of 5.0%. Now compute the price of the bond at using yield one basis point higher, or 5.01%. FV = $1,000, PMT = 21, N = 12, I/Y = (5.01 / 2 =) 2.505, CPT PV = –$958.47. The price changes from $958.97 to $958.47, or $0.50.

(Module 46.2, LOS 46.g)

Question #90 of 107

Question ID: 1458721

A $1,000 face, 10-year, 8.00% semi-annual coupon, option-free bond is issued at par (market rates are thus 8.00%). Given that the bond price decreased 10.03% when market rates increased 150 basis points (bp),if market yields decrease by 150 bp, the bond's price will:

A) decrease by more than 10.03%.

B) increase by more than 10.03%.

C) increase by 10.03%.

Explanation

Because of positive convexity, (bond prices rise faster than they fall) for any given absolute change in yield, the increase in price will be more than the decrease in price for a fixed-coupon, noncallable bond. As yields increase, bond prices fall, and the price curve gets flatter, and changes in yield have a smaller effect on bond prices. As yields decrease, bond prices rise, and the price curve gets steeper, and changes in yield have a larger effect on bond prices. Here, for an absolute 150bp change, the price increase would be more than the price decrease.

(Module 46.3, LOS 46.h)

Question #91 of 107

Question ID: 1458706

Given the three bonds listed here, which bond has the *most* interest rate risk?

A) 8-year maturity, 12.0% coupon.

B) 24-year maturity, 5.0% coupon.

C) 8-year maturity, 5.5% coupon.

Explanation

Interest rate risk (or price volatility) increases at longer maturities and with lower coupons.

(Module 46.2, LOS 46.e)

Question #92 of 107

Question ID: 1458734

A bond has the following characteristics:

- Maturity of 30 years
- Modified duration of 16.9 years
- Yield to maturity of 6.5%

If the yield to maturity *decreases* by 0.75%, what will be the percentage change in the bond's price?

A) +12.675%.

B) 0.750%.

C) -12.675%.

Explanation

Approximate percentage price change of a bond = (-)(modified duration)(ΔYTM)

= (-16.9)(-0.75%) = +12.675%

(Module 46.3, LOS 46.i)

Question #93 of 107

Question ID: 1458707

A bond portfolio consists of a AAA bond, a AA bond, and an A bond. The prices of the bonds are $1,050, $1,000, and $950 respectively. The durations are 8, 6, and 4 respectively. What is the duration of the portfolio?

A) 6.00.

B) 6.07.

C) 6.67.

Explanation

The duration of a bond portfolio is the weighted average of the durations of the bonds in the portfolio. The weights are the value of each bond divided by the value of the portfolio:

> portfolio duration = 8 × (1050 / 3000) + 6 × (1000 / 3000) + 4 × (950 / 3000) = 2.8 + 2 + 1.27 = 6.07.

(Module 46.2, LOS 46.f)

Question #94 of 107

Question ID: 1458671

A 30-year semi-annual coupon bond issued today with market rates at 6.75% pays a 6.75% coupon. If the market yield declines by 30 basis points, the price increases to $1,039.59. If the market yield rises by 30 basis points, the price decreases to $962.77. The bond's approximate modified duration is *closest* to:

A) 1.3%.

B) 12.8%.

C) 3.9%.

Explanation

Approximate modified duration =

> (price if yield down − price if yield up) / (2 × initial price × yield change expressed as a decimal).

Here, the initial price is par, or $1,000 because we are told the bond was issued today at par. So, the calculation is: (1039.59 − 962.77) / (2 × 1000 × 0.003) = 76.82 / 6.00 = **12.80**.

(Module 46.1, LOS 46.b)

Question #95 of 107

Question ID: 1458759

Which of the following is *least likely* to increase a bond's yield spread to the benchmark yield curve?

A) Credit rating downgrade.

B) Decrease in liquidity.

C) Increase in expected inflation.

Explanation

Interest rates on the benchmark yield curve are composed of expected inflation and the real risk-free rate. Spreads to the benchmark yield curve include premiums for credit risk and lack of liquidity.

(Module 46.3, LOS 46.l)

Question #96 of 107

Question ID: 1458722

Which of the following statements *best* describes the concept of negative convexity in bond prices? As interest rates:

A) fall, the bond's price increases at a decreasing rate.

B) fall, the bond's price increases at an increasing rate.

C) rise, the bond's price decreases at a decreasing rate.

Explanation

Negative convexity occurs with bonds that have prepayment/call features. As interest rates fall, the borrower/issuer is more likely to repay/call the bond, which causes the bond's price to approach a maximum. As such, the bond's price increases at a decreasing rate as interest rates decrease.

(Module 46.3, LOS 46.h)

Question #97 of 107

Question ID: 1458690

Which of the following statements concerning the price volatility of bonds is *most* accurate?

A) Bonds with higher coupons have lower interest rate risk.

B) As the yield on callable bonds approaches the coupon rate, the bond's price will approach a "floor" value.

C) Bonds with longer maturities have lower interest rate risk.

Explanation

Other things equal, bonds with higher coupons have lower interest rate risk. Note that the other statements are false. Bonds with longer maturities have *higher* interest rate risk. Callable bonds have a ceiling value as yields decline.

(Module 46.2, LOS 46.e)

Question #98 of 107

Question ID: 1458753

If the term structure of yield volatility slopes upward:

A) long-term interest rates are more variable than short-term interest rates.

B) short-term interest rates are less than long-term interest rates.

C) forward interest rates are higher than spot interest rates.

Explanation

If the term structure of yield volatility slopes upward, long-term interest rates are more variable than short-term interest rates.

(Module 46.3, LOS 46.j)

Question #99 of 107

Question ID: 1458724

Adjusting for convexity improves an estimated price change for a bond compared to using duration alone because:

A) it measures the volatility of non-callable bonds.

B) the slope of the callable bond price/yield curve is backward bending at high interest rates.

C) the slope of the price/yield curve is not constant.

Explanation

Modified duration is a good approximation of price changes for an option-free bond only for relatively small changes in interest rates. *As rate changes grow larger, the curvature of the bond price/yield relationship becomes more prevalent, meaning that a linear estimate of price changes will contain errors.* The modified duration estimate is a linear estimate, as it assumes that the change is the same for each basis point change in required yield. *The error in the estimate is due to the curvature of the actual price path. This is the degree of convexity.* If we can generate a measure of this convexity, we can use this to improve our estimate of bond price changes.

(Module 46.3, LOS 46.h)

Question #100 of 107

Question ID: 1458723

Negative convexity is *most likely* to be observed in:

A) callable bonds. ✓

B) government bonds. ✗

C) zero coupon bonds. ✗

Explanation

All noncallable bonds exhibit the trait of being positively convex. Callable bonds have negative convexity because once the yield falls below a certain point prices will rise at a decreasing rate, thus giving the price-yield relationship a negative convex shape.

(Module 46.3, LOS 46.h)

Question #101 of 107

Question ID: 1458665

Assume that the current price of an annual-pay bond is 102.50 per 100 of face value. If its YTM increases by 0.5% the value of the bond decreases to 100 and if its YTM decreases by 0.5% the price of the bond increases to 105.5. What is the approximate modified duration of the bond?

A) 5.37. ✓

B) 5.48. ✗

C) 5.50. ✗

Explanation

Approximate modified duration is computed as follows:

$$\text{Duration} = \frac{105.50 - 100}{2 \times 102.50 \times 0.005} = 5.37$$

(Module 46.1, LOS 46.b)

Question #102 of 107

Question ID: 1458744

A bond's duration is 4.5 and its convexity is 87.2. If interest rates rise 100 basis points, the bond's percentage price change is *closest* to:

A) -4.06%. ✓

B) -4.50%. ✗

C) -4.94%. ✗

Explanation

Recall that the percentage change in prices = Duration effect + Convexity effect = [-duration × (change in yields)] + [(½)convexity × (change in yields)^2] = (-4.5)(0.01) + (½)(87.2)(0.01)^2 = -4.06%. Remember that you must use the decimal representation of the change in interest rates when computing the duration and convexity adjustments.

(Module 46.3, LOS 46.i)

Question #103 of 107

Question ID: 1458684

An investor gathered the following information on two U.S. corporate bonds:

- Bond J is callable with maturity of 5 years
- Bond J has a par value of $10,000
- Bond M is option-free with a maturity of 5 years
- Bond M has a par value of $1,000

For each bond, which duration calculation should be applied?

	Bond J	Bond M	
A)	Effective Duration	Effective Duration only	✗

B)	Effective Duration	Modified Duration or Effective Duration	✓
C)	Modified Duration	Effective Duration only	✗

Explanation

Effective duration is that effective duration is used for bonds with embedded options. Modified duration assumes that all the cash flows on the bond will not change, while effective duration considers expected cash flow changes that may occur with embedded options.

(Module 46.1, LOS 46.c)

Question #104 of 107

Question ID: 1458738

If a Treasury bond has an annual modified duration of 10.27 and an annual convexity of 143, which of the following is *closest* to the estimated percentage price change in the bond for a 125 basis point increase in interest rates?

A) -11.72%. ✓

B) -13.96%. ✗

C) -9.33%. ✗

Explanation

The estimated percentage price change = the duration effect plus the convexity effect. The formula is: [–duration × (ΔYTM)] + ½[convexity × $(\Delta YTM)^2$]. Therefore, the estimated percentage price change is: [–(10.27)(0.0125)] + [(½)(143)$(0.0125)^2$] = –0.128375 + 0.011172 = –0.117203 = –11.72%.

(Module 46.3, LOS 46.i)

Question #105 of 107

Question ID: 1458691

Which of the following five year bonds has the *highest* interest rate sensitivity?

A) Option-free 5% coupon bond. ✗

B) Zero-coupon bond. ✓

C) Floating rate bond.

Explanation

The Macaulay duration of a zero-coupon bond is equal to its time to maturity. Its price is greatly affected by changes in interest rates because its only cash-flow is at maturity and is discounted from the time at maturity until the present.

(Module 46.2, LOS 46.e)

Question #106 of 107

Question ID: 1458672

A bond with a yield to maturity of 8.0% is priced at 96.00. If its yield increases to 8.3% its price will decrease to 94.06. If its yield decreases to 7.7% its price will increase to 98.47. The modified duration of the bond is *closest to*:

A) 4.34.

B) 2.75.

C) 7.66.

Explanation

The change in the yield is 30 basis points.

Approximate modified duration = (98.47 − 94.06) / (2 × 96.00 × 0.003) = 7.6563.

(Module 46.1, LOS 46.b)

Question #107 of 107

Question ID: 1458736

For a given bond, the duration is 8 and the convexity is 100. For a 60 basis point decrease in yield, what is the approximate percentage price change of the bond?

A) 2.52%.

B) 4.62%.

C) 4.98%.

Explanation

The estimated price change is -(duration)(ΔYTM) + (½)(convexity) × (ΔYTM)^2 = -8 × (-0.006) + (½)(100) × (-0.006^2) = +0.0498 or 4.98%.

(Module 46.3, LOS 46.i)