1. You expect the Federal Reserve will begin to loosen credit and force yields down by 50 basis points across all maturities in the very near future. (A basis point is equal to 1/100th of 1 percent so 50 basis points are equal to ½ of 1%.) How do you expect the Fed's policy effect will show up in the bond market?

    a) Bond prices will decrease.
    No! Think about how a decrease in yields affects the present value of the bond's promised cash flows.
    b) Bond prices will increase.
    Correct. There is an inverse relationship between bond prices and yields.
    c) Bond prices will remain the same.
    No! Think about how a decrease in yields affects the present value of the bond's promised cash flows.
    d) Not enough information.
    No! What are the two things that you need to calculate the value of a bond? Is the yield on the bond one of those things? Does a decrease in the yield make the bond more or less valuable?

    Answer:

    The correct answer is **b**.

    There is an inverse relationship between bond prices and yields.

2. The price of a US government issued five year zero coupon bond, with a face value of $1000, is $744.09. What is the yield to maturity of the bond if the interest is compounded yearly? Round off your final answer to two digits after the decimal point. State your answer as a percentage rate (i.e. x.xx)

    Answer:

    The correct answer is **6.09**.

    Review the lecture notes on zero-coupon bond valuation and the definition of yield to maturity. Recall that the yield to maturity is the discount rate that makes the present value of a bond's promised cash flows equal to its current price. The price of a zero-coupon bond is given by

    $B_0 = \text{Face Value}/(1+r)^T$

    where T is the years to maturity and r is the annual interest rate.

    Recall that the yield to maturity is the discount rate that makes the present value of a bond's promised cash flows equal to its current price. The zero-coupon bond has only face value. Therefore, we can solve for r:

$B_0 = 744.09 = 1000/(1+r)^5$

$r = 6.09\%$

3. What is the market value of a 20-year bond with face value of $1000, which makes quarterly coupon payments at a coupon rate of 10%, if the required rate of return is 8% per year, compounded quarterly? Round off your final answer to three digits after the decimal point. State your answer as 'x.xxx'

   Answer:

   The correct answer is **1,198.723**.

   The value of the bond is equal to the present value of the promised cash flows on the bond. This bond has quarterly coupon payments of $25 and the face value of $1000 at maturity.

   $B_0$ = PV(coupon payments) + PV(face value)

   The coupon payments can be valued as an annuity:

   PV(coupon payments) = 25 x ADF(r = 8%/4, n= 4x20) = $25\times[(1 - 1/(1.02)^{80})/0.02]$

   PV(face value) = $1000/(1.02)^{80}$

   $B_0$ =1198.722568 = 1,198.723.

4. Consider a bond, which pays $80 in annual coupon, and has a face value of $1,000. What is its yield to maturity if the bond has 20 years remaining until maturity and currently selling for $1,200?

   a) 8.32%
      False. Note that it is not possible to solve for the yield to maturity algebraically. You can get an approximate answer by trial and error, or you can use Excel's RATE function, or a financial calculator. Since the bond is selling at a premium, that is at a price greater than its par value, its yield to maturity should be less than the coupon rate 8%.
   b) 9.67%
      False. Note that it is not possible to solve for the yield to maturity algebraically. You can get an approximate answer by trial and error, or you can use Excel's RATE function, or a financial calculator. Since the bond is selling at a premium, that is at a price greater than its par value, its yield to maturity should be less than the coupon rate 8%.
   c) 6.22%

True. Note that it is not possible to solve for the yield to maturity algebraically. You can get an approximate answer by trial and error, or you can use Excel's RATE function, or a financial calculator. Since the bond is selling at a premium, that is at a price greater than its par value, its yield to maturity should be less than the coupon rate 8%.

d) 8.77%
False. Note that it is not possible to solve for the yield to maturity algebraically. You can get an approximate answer by trial and error, or you can use Excel's RATE function, or a financial calculator. Since the bond is selling at a premium, that is at a price greater than its par value, its yield to maturity should be less than the coupon rate 8%.

Answer:

The correct answer is **c**.

5. You have just purchased a newly issued $1,000 five-year Vanguard Company bond at par. This five-year bond pays $60 in semi-annual coupon payments. You are also considering the purchase of another Vanguard Company bond that pays $30 in semi-annual coupons and has six years remaining before maturity. This bond also has a face value of $1000. Both bonds make coupon payments semiannually.

   What is the yield-to-maturity on the five-year bond? State your answer as a percentage rate.

   Answer:

   The correct answer is **12**.

   The yield to maturity is the discount rate that makes the present value of the bond's promised cash flows equal to its current price. When the bond is selling at par, the yield to maturity is equal to its coupon rate.

6. Refer to back to Question 5. What is the effective annual yield on the five-year bond? Round off your final answer to two digits after the decimal point. State your answer as a percentage rate (i.e 'x.xx')

   Answer:

   The correct answer is **12.36**.

   The yield to maturity is expressed as an annual percentage rate. The effective annual yield represents the effective rate when it is compounded semi-annually. It is computed similar to the effective annual rate.

   Recall $EAR = (1 + APR/m)^m - 1$

where APR is the annual percentage rate and m is the number of compounding periods.

effective annual yield = EAR = $(1 + 12\%/2)^2 - 1 = 12.36\%$

7. Refer back to Question 5. Assume that the five-year bond and the six-year bond have the same yield. What should you be willing to pay for the six-year bond? Round off your final answer to three digits after the decimal point. State your answer as 'x.xxx'

   Answer:

   The correct answer is **748.485**.

   The value of the bond is equal to the present value of its coupon payments plus the present value of the face value.

   The six-year bond makes $30 coupon payments every six months and has twelve coupon payments remaining in addition to the face value. The yield is 12 percent per year.

   $B_0$ = PV(coupon payments) + PV(face value)

   The coupon payments can be valued as an annuity:

   PV(coupon payments) = 30 x ADF(r = 12%/2, n= 6x2) = $30\times[(1 - 1/(1.06)^{12})/0.06$

   PV(face value) = $1000/(1.06)^{12}$

   PV(coupon payments) + PV(face value) = 748.4846 = 748.485

8. Suppose that you purchased a 15-year bond that pays semi-annual coupon of $20 and is currently selling at par. What would your realized annual return be if you sold the bond five years later when the yield is 5.5%? State your answer as a percentage rate rounded to three digits after the decimal point, i.e. 'x.xxx'

   Answer:

   The correct answer is **1.807**.

   The bond is currently selling at par. That means its price is equal to its face value $1000. It also means that the currently its yield to maturity is equal to its coupon rate of 4%. In order to compute your realized return you first need to find the price at the end of five years, when the bond yield goes up to 5.5%.

   $B_5=20\times[(1-1/(1.0275)^{20})/0.0275]+1000/(1.0275)^{20}=885.796$

You then need to find the internal rate of return on your investment: We are now looking for the internal rate of return on our investment. Recall that in this case the internal rate of return is the discount rate that makes the present value of the bond's cash flows equal to the value of the bond when purchased.

$1000=20\times[(1-1/(1+r)^{10})/r]+885.80/(1+r)^{10}$

Solving for r gives the six-month rate so do not forget to multiply by two.

The six-month rate is 0.90363%. The annual yield is 1.807%