FIP ASSIGNMENT

- Palak Nagdev
- 419

1. current yield = bond's value x (1 + semi-annual interest rate) ^{n}
   in this case:
   - bond's value = $1,000 (we choose the value)
   - semi-annual interest rate = 8% / 2 = 4%
   - n = 2 semi-annual coupons

   current yield = $1,000 x (1 + 4%) ^{2} = $1,000 x 1.0816 = $1,081.60
   in order for a bond that pays an annual coupon to be sold at the same value, it must yield the same return = ($1,081.60 - $1,000) / $1,000 = 8.16%

2.
   a)
   b)

3.
   a) Price = PV of cash flows = $100(1+r)/(1+r) + 100(1+r)/(1+r) + 100(1+r)^2/(1+r)^2 + \ldots = 400$
   b) Duration = (1 + 2 + 3 + 4)/4 = 2.5 years

4. (b) the entire value of the treasury strip is in the principal repayment in the distant future; it has the highest duration and is most sensitive to a change in the interest rate.
   (c) despite having the same maturity as (b), (c) has 5.5% coupon payments that dampen its sensitivity to interest rate changes.
   (d) higher coupon payment → lower duration.
   (a) T-bills are only for 1 to 6 months; they have the smallest duration.

5.
   a)
   b

6. If the underwriter purchases the bonds from the corporate client, then it assumes the full risk of being unable to resell the bonds at the stipulated offering price. In other words, the underwriter bears the risk of interest rate movement between the time of purchase and the time of resale. For long-maturity bonds, it is generally true that their duration is also long. Thus, bonds with long maturities are more exposed to interest rate movement risk. Therefore, the underwriter demands a larger spread (higher underwriting fees) between the purchase price and the stipulated offering price.

   "The price of a floater will always trade at its par value," is a statement that one can disagree with.
   A floating-rate security's (or floater's) coupon rate is equal to the reference rate plus a spread or margin. A floater's coupon rate, for example, could reset at the rate on a three-month Treasury bill + 50 basis points (the spread).
   The price of a floater is then determined by two factors: (1) the spread over the reference rate and (2) any limits that may be imposed on the resetting of the coupon rate The coupon rate of a floater, for example, can have a cap or a floor. The cost of a floater will grow. (2) Any restrictions on the resetting of the coupon rate that may be applied. A floater, for example, may have a maximum coupon rate, known as a cap, and a minimum coupon rate, known as a floor.

A floater's price will trade close to its par value as long as (1) the market's required spread above the reference rate remains intact and (2) neither the cap nor the floor is reache

A floater's price will trade below (above) par if the market wants a wider (smaller) spread. The price of a floater will trade below par if the coupon rate is limited from shifting to the reference rate plus the spread due to the cap.

7.

a) We have a 10-year 6% coupon bond with a par value of $100 and a required yield of 15%. Given C = 0.06($100) / 2 = $3, n = 2(10) = 20 and r = 0.15 / 2 = 0.075, the present value of the coupon payments is: $30.5835
The present value of the par or maturity value of $100 is:
23.5413. Thus, the price of the bond (P) = $30.5835 + $23.5413 = $54.125.
b) if 15% = Thus, the price of the bond (P) = $30.5835 + $23.5413 = $54.125.
if 16% =Thus, the price of the bond (P) = $29.4544 + $21.4548= $50.909.
(50.909 – 54.125)/54.125 = -5.9%
c) We have a 10-year 6% coupon bond with a par value of $100 and a required yield of 5%. Given C = 0.06($100) / 2 = $3, n = 2(10) = 20 and r = 0.05 / 2 = 0.025
Thus, the price of the bond (P) = $46.7675 + $61.0271 = $107.795.
d) The price of the bond (P) = $446.324 + $553.676 = $1,000.00. [NOTE. We already knew the answer would be $100 because the coupon rate equals the yield to maturity.]
The bond price falls with the percentage fall equal to ($100.00 - $107.795) / $107.795 = −0.072310 or about -7.23%.
e) We can say that there is more volatility in a low-interest-rate environment because there was a greater fall (-7.23% versus -5.94%).

8. Coupon + I on I = future value of a 10 period, $45, 4.70% annuity
NPER = 10 RATE = 0.047 PMT = 45 FV = 558.14
Sale Price at time 5 is the price of a 2 year, 9% coupon bond with a YTM of 11.2%
NPER = 4 RATE = 0.056 PMT = 45 FV = 1000 PV = 961.53
Total Future Dollars = $558.14 + $961.53 = $1,519.67
Periodic Return over the 10 periods = ($1,519.67/$1,000)1/10 – 1 = 0.04274
Total Return (reported in Bond Annual Yield basis) = 2 x 0.04274 = 8.55%
9. Because there is no reinvestment risk with a zero-coupon bond, the total return is equal to the yield to maturity, hence the total return is also 8%.
When yields change, the price responsiveness of a zero-coupon bond varies. Zero-coupon bonds, like other bonds, are more price responsive to changes in interest rates at higher maturity levels. Zero-coupon bonds, like other bonds, are more price responsive to changes at lower interest rates than at higher interest rates.
Bonds with lower coupon rates will have longer modified and Macaulay duration, except long-maturity deep-discount bonds. Furthermore, zero-coupon bonds have larger convexity and consequently greater price reactivity to changes in yields for a given rate and term.
10. The modified duration multiplied by one plus the yield equals the Macaulay duration. After rearranging the equation, you get:

$$Modified\ duration = Macaula \quad \frac{duration}{1 + y}$$

11. Duration seeks to assess an asset's price sensitivity to yield fluctuations, albeit it is not the only or best metric. A duration is a useful tool for calculating the percentage price change of an asset in response to a slight change in yield. However, it does not perform as well when there is a significant shift in yield. To augment the approximate price change using duration, the % price change owing to convexity can be employed. The duration of a portfolio is the weighted average of each asset's duration. The fact that two portfolios of the same term have

the same weighted average does not mean they have the same assets, the same mix of assets, or assets with the same maturities. As a result, if there is a change,
To further understand why two portfolios with the same duration can be differently influenced by a change in interest rates consider the derivation of duration. In the derivation of the relationship between modified duration (which is the approximate percentage change in price for a 100-basis-point change in yield) and bond price volatility, we started with the bond price equation. This price equation assumes that all cash flows for the bond are discounted at the same rate of discount The yield curve is assumed to be flat and all shifts are to be parallel in this derivation. When this assumption is violated and the yield curve does not shift in a parallel manner, the application of duration has limitations. This is crucial when attempting to evaluate the responsiveness of a portfolio's value to interest rate changes using the length of the portfolio. If a portfolio contains bonds with varying maturities, the duration measure may not provide a reasonable assessment of unequal interest rate changes across maturities. When interest rates fluctuate, the value of two portfolios with the same term will not necessarily move in the same way.

12.

a)

13.

a) The relationship between the yield on bonds of the same credit quality but various maturities are depicted graphically. Usually derived from Treasury market price and yield observations.

Treasury securities have no danger of default. The Treasury market is the largest and most active bond market, wit