Financial Management

FINA 2010, Semester II, 2020-2021

Assignment 6 (Solution)

1 March, 2021

1. Questions from Chapter 7 of the text book (Page 232, Concepts Review and Critical Thinking Questions)

Q8: Companies pay to have their bonds rated because unrated bonds can be difficult to sell; many large investors are prohibited from investing in unrated issues.

Q10: The term structure is based on pure discount bonds. The yield curve is based on coupon-bearing issues.

Q14: Companies argue that bond rating agencies are pressuring them to pay for bond ratings. When a company pays for a rating, it has the opportunity to make its case for a particular rating. With an unsolicited rating, the company has no input.

2. Questions from Chapter 7 of the text book (Page 233, Questions and Problems)

Q1: The yield to maturity is the required rate of return on a bond expressed as a nominal annual interest rate. For noncallable bonds, the yield to maturity and required rate of return are interchangeable terms. Unlike YTM and required return, the coupon rate is not a return used as the interest rate in bond cash flow valuation, but is a fixed percentage of par over the life of the bond used to set the coupon payment amount. For the example given, the coupon rate on the bond is still 10 percent, and the YTM is 8 percent.

Q19: Any bond that sells at par has a YTM equal to the coupon rate. Both bonds sell at par, so the initial YTM on both bonds is the coupon rate, 7.3 percent. If the YTM suddenly rises to 9.3 percent:

P_{Sam} = \$36.50($PVIFA_{4.65\%,6}$) + \$1,000($PVIF_{4.65\%,6}$) = \$948.67

P_{Dave} = \$36.50($PVIFA_{4.65\%,40}$) + \$1,000($PVIF_{4.65\%,40}$) = \$819.86

The percentage change in price is calculated as:

Percentage change in price = (New price – Original price)/Original price

$\Delta P_{Sam}\%$ = (\$948.67 – 1,000)/\$1,000 = –.0513, or –5.13%

$\Delta P_{Dave}\%$ = (\$819.86 – 1,000)/\$1,000 = –.1801, or –18.01%

If the YTM suddenly falls to 5.3 percent:

P_{Sam} = \$36.50($PVIFA_{2.65\%,6}$) + \$1,000($PVIF_{2.65\%,6}$) = \$1,054.81

P_{Dave} = \$36.50($PVIFA_{2.65\%,40}$) + \$1,000($PVIF_{2.65\%,40}$) = \$1,244.80

$\Delta P_{Sam}\%$ = (\$1,054.81 – 1,000)/\$1,000 = .0548, or 5.48%

$\Delta P_{Dave}\%$ = (\$1,244.80 – 1,000)/\$1,000 = .2448, or 24.48%

All else the same, the longer the maturity of a bond, the greater is its price sensitivity to changes in interest rates.

Q25: To find the number of years to maturity for the bond, we need to find the price of the bond. Since we already have the coupon rate, we can use the bond price equation, and solve for the number of years to maturity. We are given the current yield of the bond, so we can calculate the price as:

Current yield = .0755 = \$80/P_0

P_0 = \$80/.0755 = \$1,059.60

Now that we have the price of the bond, the bond price equation is:

P = \$1,059.60 = \$80[(1 – (1/1.072)^t)/.072] + \$1,000/1.072^t

We can solve this equation for *t* as follows:

\$1,059.60(1.072)^t = \$1,111.11(1.072)^t – 1,111.11 + 1,000

111.11 = 51.51(1.072)^t

2.1571 = 1.072^t

t = ln2.1571/ln1.072 = 11.06

The bond has 11.06 years to maturity.

Q27:

a. The bond price is the present value of the cash flows from a bond. The YTM is the interest rate used in valuing the cash flows from a bond. The bond price and YTM are inversely related. If the YTM increases, the bond price decreases and if the YTM decreases, the bond price increases.

b. If the coupon rate is higher than the required return on a bond, the bond will sell at a premium, since it provides periodic income in the form of coupon payments in excess of that required by investors on other similar bonds. If the coupon rate is lower than the required return on a bond, the bond will sell at a discount since it provides insufficient coupon payments compared to that required by investors on other similar bonds. For premium bonds, the coupon rate exceeds the YTM; for discount bonds, the YTM exceeds the coupon rate, and for bonds selling at par, the YTM is equal to the coupon rate.

c. Current yield is defined as the annual coupon payment divided by the current bond price. For premium bonds, the current yield exceeds the YTM, for discount bonds the current yield is less than the YTM, and for bonds selling at par value, the current yield is equal to the YTM. In all

cases, the current yield plus the expected one-period capital gains yield of the bond must be equal to the required return.

Q33:

a. The rate of return you expect to earn if you purchase a bond and hold it until maturity is the YTM. The bond price equation for this bond is:
$P_0 = \$1{,}060 = \$70(PVIFA_{R\%,21}) + \$1{,}000(PVIF_{R\%,21})$
Using a spreadsheet, financial calculator, or trial and error we find:

R = YTM = 6.47%

b. To find our HPY, we need to find the price of the bond in two years. The price of the bond in two years, at the new interest rate, will be:

$P_2 = \$70(PVIFA_{6.47\%,19}) + \$1{,}000(PVIF_{6.47\%,19})$
$P_2 = \$1{,}178.07$

To calculate the HPY, we need to find the interest rate that equates the price we paid for the bond with the cash flows we received. The cash flows we received were $70 each year for two years and the price of the bond when we sold it. The equation to find our HPY is:
$P_0 = \$1{,}060 = \$70(PVIFA_{R\%,2}) + \$1{,}178.07(PVIF_{R\%,2})$
Solving for R, we get:
R = HPY = 11.86%

The realized HPY is greater than the expected YTM when the bond was bought because interest rates dropped by 1 percent; bond prices rise when yields fall.

3. Mary just purchased a bond which pays $60 a year in interest. What is this $60 called?
A. coupon
B. face value
C. discount
D. call premium
E. yield

4. The specified date on which the principal amount of a bond is payable is referred to as which one of the following?
A. coupon date
B. yield date
C. maturity
D. dirty date
E. clean date

5. The current yield is defined as the annual interest on a bond divided by which one of the following?
A. coupon
B. face value
C. market price
D. call price
E. dirty price

6. A bond that is payable to whomever has physical possession of the bond is said to be in:
A. new-issue condition.
B. registered form.
C. bearer form.
D. debenture status.
E. collateral status.

7. The Leeward Company just issued 15-year, 8 percent, unsecured bonds at par. These bonds fit the definition of which one of the following terms?
A. note
B. discounted
C. zero-coupon
D. callable
E. debenture

8. A sinking fund is managed by a trustee for which one of the following purposes?
A. paying interest payments
B. early bond redemption
C. converting bonds into equity securities
D. paying preferred dividends
E. reducing coupon rates

9. A $1,000 face value bond can be redeemed early at the issuer's discretion for $1,030, plus any accrued interest. The additional $30 is called which one of the following?
A. dirty price
B. redemption value
C. call premium
D. original-issue discount
E. redemption discount

10. A call-protected bond is a bond that:
A. is guaranteed to be called.
B. can never be called.
C. is currently being called.
D. is callable at any time.
E. cannot be called during a certain period of time.

11. You want to buy a bond from a dealer. Which one of the following prices will you pay?
A. call price
B. auction price
C. bid price
D. asked price
E. bid-ask spread

12. A bond is quoted at a price of $989. This price is referred to as which one of the following?
A. call price
B. face value
C. clean price
D. dirty price
E. wholesale price

13. Which one of the following premiums is compensation for expected future inflation?
A. default risk
B. taxability
C. liquidity
D. inflation
E. interest rate risk

14. A Treasury yield curve plots Treasury interest rates relative to which one of the following?
A. market rates
B. comparable corporate bond rates
C. the risk-free rate
D. inflation
E. maturity

15. The liquidity premium is compensation to investors for:
A. purchasing a bond in the secondary market.
B. the lack of an active market wherein a bond can be sold for its actual value.
C. acquiring a bond with an unfavorable tax status.
D. redeeming a bond prior to maturity.
E. purchasing a bond that has defaulted on its coupon payments.

16. An 8 percent corporate bond that pays interest semi-annually was issued last year. Which two of the following most likely apply to this bond today if the current yield-to-maturity is 7 percent?
I. a structure as an interest-only loan
II. a current yield that equals the coupon rate
III. a yield-to-maturity equal to the coupon rate
IV. a market price that differs from the face value
A. I and III only
B. I and IV only
C. II and III only
D. II and IV only
E. III and IV only

17. All else constant, a bond will sell at _____ when the coupon rate is _____ the yield to maturity.
A. a premium; less than
B. a premium; equal to
C. a discount; less than
D. a discount; higher than
E. par; less than

18. Which of the following are characteristics of a premium bond?
I. coupon rate < yield-to-maturity
II. coupon rate > yield-to-maturity
III. coupon rate < current yield
IV. coupon rate > current yield
A. I only
B. I and III only
C. I and IV only
D. II and III only
E. II and IV only

19. Which of the following increase the price sensitivity of a bond to changes in interest rates?
I. increase in time to maturity
II. decrease in time to maturity
III. increase in coupon rate
IV. decrease in coupon rate
A. II only
B. I and III only
C. I and IV only
D. II and III only
E. II and IV only

20. Which one of the following bonds is the least sensitive to interest rate risk?
A. 3-year; 4 percent coupon
B. 3-year; 6 percent coupon
C. 5-year; 6 percent coupon
D. 7-year; 6 percent coupon
E. 7-year; 4 percent coupon

21. Last year, you purchased a "TIPS" at par. Since that time, both market interest rates and the inflation rate have increased by 0.25 percent. Your bond has most likely done which one of the following since last year?
A. decreased in value due to the change in inflation rates
B. experienced an increase in its bond rating
C. maintained a fixed real rate of return
D. increased in value in response to the change in market rates
E. increased in value due to a decrease in time to maturity

22. A U.S. Treasury bond that is quoted at 100:11 is selling:
A. for 11 percent more than par value.
B. at an 11 percent discount.
C. for 100.11 percent of face value.
D. at par and pays an 11 percent coupon.
E. for 100 and 11/32nds percent of face value.

23. Which of the following statements is correct concerning the term structure of interest rates?
I. Expectations of lower inflation rates in the future tend to lower the slope of the term structure of interest rates.
II. The term structure of interest rates includes both an inflation premium and an interest rate risk premium.

III. The real rate of return has minimal, if any, affect on the slope of the term structure of interest rates.
IV. The term structure of interest rates and the time to maturity are always directly related.
A. I and II only
B. II and IV only
C. I, II, and III only
D. II, III, and IV only
E. I, II, and IV only

24. The bonds issued by Stainless Tubs bear a 6 percent coupon, payable semiannually. The bonds mature in 11 years and have a $1,000 face value. Currently, the bonds sell for $989. What is the yield to maturity?
A. 5.87 percent
B. 5.92 percent
C. 6.08 percent
D. 6.14 percent
E. 6.20 percent

$$\$989 = \frac{0.06 \times \$1{,}000}{2} \times \left\{ \frac{1 - \left[1 / \left(1 + \frac{r}{2} \right)^{11 \times 2} \right]}{\frac{r}{2}} \right\} + \frac{\$1{,}000}{\left(1 + \frac{r}{2} \right)^{11 \times 2}}$$

This cannot be solved directly, so it's easiest to just use the calculator method to get an answer. You can then use the calculator answer as the rate in the formula just to verify that your answer is correct.

Enter	11×2	/2	-989	60/2	1,000
	N	I/Y	PV	PMT	FV
Solve for		6.14			

25. Oil Well Supply offers 7.5 percent coupon bonds with semiannual payments and a yield to maturity of 7.68 percent. The bonds mature in 6 years. What is the market price per bond if the face value is $1,000?
A. $989.70
B. $991.47
C. $996.48
D. $1,002.60
E. $1,013.48

$$P=\frac{0.075\times\$1{,}000}{2}\times\left\{\frac{1-\left[1/\left(1+\frac{0.0768}{2}\right)^{6\times2}\right]}{\frac{0.0768}{2}}\right\}+\frac{\$1{,}000}{\left(1+\frac{0.0768}{2}\right)^{6\times2}}=\$991.47$$

Enter	6×2	7.68/2		75/2	1,000
	N	I/Y	PV	PMT	FV
Solve for			- 991.47		

26. Redesigned Computers has 5.25 percent coupon bonds outstanding with a current market price of $546.19. The yield to maturity is 16.28 percent and the face value is $1,000. Interest is paid semiannually. How many years is it until these bonds mature?
A. 6.64 years
B. 7.08 years
C. 12.41 years
D. 14.16 years
E. 28.32 years

$$\$546.19=\frac{.0525\times\$1{,}000}{2}\times\left\{\frac{1-\left[1/\left(1+\frac{0.1625}{2}\right)^{t\times2}\right]}{\frac{0.1628}{2}}\right\}+\frac{\$1{,}000}{\left(1+\frac{0.1628}{2}\right)^{t\times2}}$$

It's easiest to solve this problem using a financial calculator. You can then use the calculator answer as the time period in the formula just to verify that your answer is correct.

Enter		16.28/2	-546.19	52.5/2	1,000
	N	I/Y	PV	PMT	FV
Solve for	14.16				

The number of six-month periods is 14.16. The number of years is 7.08 years.

27. Today, you want to sell a $1,000 face value zero coupon bond you currently own. The bond matures in 4.5 years. How much will you receive for your bond if the market yield to maturity is currently 5.33 percent? Ignore any accrued interest.

A. $696.60
B. $698.09
C. $741.08
D. $756.14
E. $789.22

$$P = \frac{\$1,000}{\left(1 + \frac{0.0533}{2}\right)^{4.5\times 2}} = \$789.22$$

Enter	4.5×2	5.33/2			1,000
	N	I/Y	PV	PMT	FV
Solve for			-789.22		

28. The Corner Grocer has a 7-year, 6 percent annual coupon bond outstanding with a $1,000 par value. The bond has a yield to maturity of 5.5 percent. Which one of the following statements is correct if the market yield suddenly increases to 6.5 percent?

A. The bond price will increase by $57.14.
B. The bond price will increase by 5.29 percent.
C. The bond price will decrease by $53.62.
D. The bond price will decrease by 5.43 percent.
E. The bond price will decrease by 5.36 percent.

$$P = (0.06 \times \$1,000) \times \left\{\frac{1 - \left[1/(1+0.055)^{7}\right]}{0.055}\right\} + \frac{\$1,000}{(1+0.055)^{7}} = \$1,028.41$$

Enter	7	5.5		60	1,000
	N	I/Y	PV	PMT	FV
Solve for			-1,028.41		

$$P = (0.06 \times \$1,000) \times \left\{\frac{1 - \left[1/(1+0.065)^{7}\right]}{0.065}\right\} + \frac{\$1,000}{(1+0.065)^{7}} = \$972.58$$

Enter	7	6.5		60	1,000
	N	I/Y	PV	PMT	FV
Solve for			-972.58		

Difference in prices = $972.58 - $1,028.41 = -$55.83

Percentage difference in prices = $\frac{\$972.58 - \$1,028.41}{\$1,028.41} = -5.43$ percent

29. A 10-year, 4.5 percent, semiannual coupon bond issued by Tyler Rentals has a $1,000 face value. The bond is currently quoted at 98.7. What is the clean price of this bond if the next interest payment will occur 2 months from today?

A. $987.00

B. $994.50

C. $1,002.00

D. $1,011.25

E. $1,022.50

Clean price = 0.987 × $1,000 = $987

30. A Treasury bond is quoted at a price of 101:14 with a current yield of 7.236 percent. What is the coupon rate?

A. 7.20 percent

B. 7.28 percent

C. 7.30 percent

D. 7.34 percent

E. 7.39 percent

Price = 101 and 14/32 percent of face = 1.014375 × $1,000 = $1,014.375

Annual interest = 0.07236 × $1,014.375 = $73.40

Coupon rate = $73.40/$1,000 = 7.34 percent

31. Getty Markets has bonds outstanding that pay a 5 percent semiannual coupon, have a 5.28 percent yield to maturity, and a face value of $1,000. The current rate of inflation is 4.1 percent. What is the real rate of return on these bonds?

A. 0.86 percent

B. 0.90 percent

C. 1.04 percent

D. 1.13 percent

E. 1.19 percent

$$r = \frac{1.0528}{1.041} - 1 = 1.13 \text{ percent}$$

32. An investment offers a 10.5 percent total return over the coming year. Sam Bernanke thinks the total real return on this investment will be only 4.5 percent. What does Sam believe the inflation rate will be for the next year?

A. 5.60 percent
B. 5.67 percent
C. 5.74 percent
D. 6.00 percent
E. 6.21 percent

$(1 + 0.105) = (1 + 0.045) \times (1 + h)$; h = 5.74 percent